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ANTIBIOTICS IN THE TREATMENT OF SHIGELLA AND SALMONELLA ENTERITIS

H. STEIN, M.B., M.R.C.P.E., D.C.H., *Assistant Paediatrician* and G. SHAFF, *Medical Technologist*
Department of Paediatrics and South African Institute for Medical Research, Branch Laboratory, Baragwanath Hospital, Johannesburg

Gastroenteritis is the most common illness requiring admission to the paediatric wards at Baragwanath Hospital. In 1956 over 1,000 children suffering from this illness were admitted to the wards¹ and for every one admitted at least 20 others were treated in the out-patients department. It is estimated that in 1951 every tenth child in the African population of Johannesburg succumbed to an attack of diarrhoea before reaching the age of one year.² In Cape Town, 45% of all deaths in non-European children under one year of age were due to gastroenteritis.³

It was stated at one time that, in the United States and elsewhere, most cases of diarrhoea and enteritis were due to bacillary dysentery.⁴ This would appear, even today, to apply to certain sections of the South African non-European population. In the summer of 1954-55, shigella and salmonella organisms were isolated from 71 (29%) of 241 consecutive patients with gastroenteritis admitted to one of our wards.⁵ The mortality rate among patients with these infections was considerably higher than among those suffering from 'non-specific' gastroenteritis. In an unselected series of 100 paediatric out-patients at this hospital, suffering from gastroenteritis during the summer months, 23 were found to be due to these infections.⁶ In another investigation carried out at this hospital, shigella and salmonella organisms were isolated from 37.5% of 200 consecutive paediatric admissions for gastroenteritis.² It was estimated that under ideal conditions for investigation, approximately 50% of all severe cases of gastroenteritis would be shown to be caused by shigella or salmonella infection.²

In view of the high morbidity and mortality associated with shigella and salmonella enteritis in the African population of Johannesburg, it is of great importance to determine the most efficacious antibiotics for the treatment of this group of diseases. From our investigation in 1954-55, chloramphenicol* emerged as the most effective antibiotic for these infections, as compared with sulphphonamides and oxytetracycline†. However, chloramphenicol is expensive and has certain side-effects and is therefore not an ideal drug for

out-patient use. In addition, we have gained the impression over the past few years that the efficacy of chloramphenicol against shigella and salmonella was diminishing. It was therefore considered important to reassess the place of this antibiotic in the treatment of these infections, and if possible, to find a safer and less expensive antibiotic.

MATERIAL AND METHODS

This study was done in two parts:

1. *In Vitro* Testing

During a 4-month period of the summer of 1957-58, all cultures of shigella and salmonella organisms isolated from patients in our paediatric wards and out-patients department were subjected to *in vitro* sensitivity tests. The antibiotics tested were chloramphenicol, streptomycin, neomycin, tetracycline and sulphatriad (sulphamerazine 1 part, sulphathiazole 1.4 parts, sulphadiazine 1.4 parts). There was a total of 145 positive cultures, 92 of which were shigella organisms and 53 were salmonella; of the shigella sub-groups, 64 were Flexner, 13 Sonne, 8 Newcastle and 7 Schmitz. The methods of culture and testing were as follows:

Rectal swabs were emulsified in tubes of saline and of selenite F as soon after collection as possible. The saline tubes were plated on 'SS' and desoxycholate citrate agar after approximately 20 minutes, the selenites being treated in the same way after 24 hours incubation. Suitable colonies were picked off and finally identified biochemically and serologically. Blood agar plates were flooded with a 24-hour pure culture of the organism in nutrient broth, so obtaining a uniform inoculum. Any excess fluid was poured off. The petri dishes were then incubated at 37°C, with lids ajar until dry. The antibiotic sensitivity discs were placed on the surface of the plates by means of sterile forceps at intervals of 1½ to 2 inches. These discs contained the antibiotics in strengths of 50 µg. The inverted plates were then incubated overnight at 37°C. The sensitivity of the organism was assessed as follows: Zone of inhibition of growth less than 2 mm.—'resistant'; 2-4 mm.—'slightly sensitive'; 4-6 mm.—'moderately sensitive'; greater than 6 mm.—'highly sensitive'.

* Used as chloromycetin (Parke, Davis).

† Used as terramycin (Pfizer).

2. Clinical Trials

Concurrent with the commencement of *in vitro* testing, all ward patients with shigella and salmonella enteritis were treated with chloramphenicol (chloromycetin palmitate) in a dose of 40-50 mg. per lb. body weight per day, for a period of 10 days. This was done regardless of the results shown in the *in vitro* tests. In all, 56 patients with shigella dysentery and 31 patients with salmonella enteritis, were so treated.

After *in vitro* testing had been carried out for about 2 months, it became apparent that streptomycin might also be effective in shigella and salmonella infections. Thus 19 patients with shigella dysentery and 10 patients with salmonella enteritis were treated with oral streptomycin sulphate in a dose of 40-50 mg. per lb. body weight per day, for a period of 10 days. Streptomycin sulphate was freshly made up out of ampoules in our dispensary on alternate days.

All the patients included in this trial were under 2 years of age; all were very ill, 94% requiring intravenous therapy. Relapses were assessed on the basis of increased frequency of stools, recurrence of pyrexia, and principally on a recurrence of clinical dehydration, requiring intravenous therapy. Where relapses occurred, change of therapy was made to the most effective antibiotic as indicated by the *in vitro* tests. When each course of treatment was complete, or when changes of treatment were made, rectal swab cultures were repeated to ascertain whether the original infecting organism was still present in the patient's stools. This was done immediately after a course of therapy was complete. In only a few cases could rectal swab cultures be repeated several days after completion of treatment, since shortage of hospital accommodation forced us to discharge most patients immediately after clinical cure had been effected.

RESULTS OF INVESTIGATION

1. In Vitro Tests

The results of the *in vitro* tests with shigella organisms are shown in Table I, and with salmonella organisms in Table II. These tests show that of the 92 shigella cultures tested,

TABLE I. IN VITRO ANTIBIOTIC SENSITIVITY RESULTS OF SHIGELLA ORGANISMS

Sensitivity	Antibiotic employed				
	Chloram-phenicol	Strepto-mycin	Neo-mycin	Tetra-cycline	Sulpha-triad
Highly sensitive ..	74	32	23	1	2
Moderately sensitive ..	14	49	63	41	1
Mildly sensitive ..	0	4	3	30	1
Resistant ..	4	7	3	20	88
Total No. of cases..	92	92	92	92	92

TABLE II. IN VITRO ANTIBIOTIC SENSITIVITY RESULTS OF SALMONELLA ORGANISMS

Sensitivity	Antibiotic employed				
	Chloram-phenicol	Strepto-mycin	Neo-mycin	Tetra-cycline	Sulpha-triad
Highly sensitive ..	26	26	32	0	0
Moderately sensitive ..	26	25	19	3	0
Mildly sensitive ..	0	1	1	12	0
Resistant ..	1	1	1	38	53
Total No. of cases..	53	53	53	53	53

the great majority (80%) were highly sensitive to chloramphenicol, 32 (35%) were highly sensitive to streptomycin and 23 (25%) were highly sensitive to neomycin. A high proportion (53% and 68% respectively) were moderately sensitive to streptomycin and neomycin. The sensitivity to tetracycline was poor; 20 cultures (22%) were resistant and only 1 was highly sensitive to this antibiotic. 88 (96%) of the cultures were completely resistant to sulphatriad. Analysis of the *in vitro* tests of the various shigella sub-groups (Flexner,

TABLE III. IN VITRO ANTIBIOTIC SENSITIVITY RESULTS OF SHIGELLA SUBGROUPS

	Sensitivity	Antibiotic employed				
		Chloram-phenicol	Strepto-mycin	Neo-mycin	Tetra-cycline	Sulpha-triad
Flexner 64 Cases	Highly sensitive	50	16	16	1	2
	Moderately sensitive	10	38	43	33	1
	Mildly sensitive	0	4	3	19	0
	Resistant	4	6	2	11	61
Sonnei 13 Cases	Highly sensitive	10	9	2	0	0
	Moderately sensitive	3	3	10	2	0
	Mildly sensitive	0	0	0	5	1
	Resistant	0	1	1	6	12
Newcastle 8 Cases	Highly sensitive	7	5	4	0	0
	Moderately sensitive	1	3	4	0	0
	Mildly sensitive	0	0	0	5	0
	Resistant	0	0	0	3	8
Schmitz 7 Cases	Highly sensitive	7	2	1	0	0
	Moderately sensitive	0	5	6	6	0
	Mildly sensitive	0	0	0	1	0
	Resistant	0	0	0	0	7

Sonnei, Newcastle and Schmitz) show no significant differences in sensitivity (Table III).

Of the 53 salmonella cultures tested, 32 (60%) were highly sensitive to neomycin and 26 (49%) in each case were highly sensitive to chloramphenicol and streptomycin. Most cultures (72%) were resistant to tetracycline and all were resistant to sulphatriad. One culture was resistant to all the antibiotics tested.

2. Clinical Trials

In the clinical trials (Table IV) 56 patients with shigella infection were treated with chloramphenicol; of these, 41 patients (73%) had an uneventful recovery on one course of treatment; 8 patients died, all within the first 5 days of treatment, while dehydration and electrolyte balance were being corrected; 7 patients relapsed, but ultimately recovered. In one patient relapse was due to staphylococcal enterocolitis and septicaemia.

Nineteen patients with shigella dysentery were treated with

TABLE IV. CLINICAL TRIAL (TOTAL 116 CASES)

A. GROUP TREATED ON CHLORAMPHENICOL (87 CASES)

Infection	No. of cases	Relapses	Deaths	Uneventful recovery
Shigella	56	7	8	41 (73%)
Salmonella	31	2	6	23 (74%)
Total	87	9	14	64 (74%)

B. GROUP TREATED ON STREPTOMYCIN (29 CASES)

Infection	No. of cases	Relapses	Deaths	Uneventful recovery
Shigella	19	7	4	8 (42%)
Salmonella	10	3	3	4 (40%)
Total	29	10	7	12 (41%)

oral streptomycin; of these 8 (42%) recovered uneventfully, 4 died and 7 relapsed. Relapses were treated with the antibiotic to which the particular infecting organism was most sensitive by *in vitro* tests. In 5 of these cases the antibiotic employed was chloramphenicol and in the other 2, neomycin. One of the cases in which a change was made to chloramphenicol therapy died during the course of treatment, the others recovered.

31 patients with salmonella infection were treated with chloramphenicol, of whom 23 (74%) recovered uneventfully, 6 died and 2 relapsed but responded to a second course of treatment. Deaths in this group all occurred within the first 6 days of treatment. One of the 2 patients with salmonella infection who relapsed while on chloramphenicol therapy was the only case in the whole series in which on rectal swab culture an organism was found after a complete course of therapy. The rectal swab from this patient produced the only culture of salmonella showing complete resistance to chloramphenicol *in vitro*.

10 patients with salmonella enteritis were treated with oral streptomycin; 4 (40%) of these recovered uneventfully, 3 died, and 3 relapsed. Neomycin therapy was used in 2 of the relapses and chloramphenicol in the third case. All three recovered.

The group of patients treated with oral streptomycin was relatively small and the trial of this antibiotic was abandoned as it was soon apparent that the death and relapse rate in this group was considerably higher than in the group treated with chloramphenicol.

DISCUSSION

Chloramphenicol emerged from *in vitro* tests as the most potent agent against shigellae and one of the most potent against salmonellae. These findings correlated well with the results of the clinical trials, where 73% and 74% of patients with shigella and salmonella enteritis respectively, treated with this antibiotic, made an uneventful recovery. These results compare well with those obtained in our previous series dealing with similar cases.⁵ Thus our fears that chloramphenicol was losing its efficacy in patients with these infections, was not substantiated. One case developed a staphylococcal enterocolitis and septicaemia, but no haematological complications were seen in the 87 cases treated with this antibiotic. This low incidence of complications of chloramphenicol therapy is a reflection of what we have found over several years in using it in the treatment of hundreds of cases of severe gastro-enteritis.

In vitro tests showed that the majority of shigella and salmonella cultures were sensitive to streptomycin. However,

the use of this antibiotic in the clinical trials was disappointing; only 42% and 40% of patients suffering from shigella and salmonella enteritis respectively recovered uneventfully on treatment with it. Sangster⁷ found streptomycin to be very efficacious in the treatment of a large series of adults and children suffering from shigella dysentery. However, his cases, as contrasted with ours, were not severely ill; less than 1% required intravenous therapy for dehydration. The series are thus probably not comparable. The discrepancy between our *in vitro* and *in vivo* results with streptomycin may be partly explained by the work of Forbes,⁸ who showed that *in vitro* streptomycin kills shigella Sonne in lower concentration than chlortetracycline, oxytetracycline or chloramphenicol, but that this organism acquires resistance to streptomycin earlier than to the other antibiotics. Brown and Bailey,⁹ discussing the use of streptomycin in *B. coli* gastroenteritis in infants, also state that resistance is rapidly acquired to this antibiotic by intestinal organisms.

In vitro tests showed that shigellae were slightly less sensitive to neomycin than to chloramphenicol, but that salmonellae were more sensitive to neomycin than to any of the other antibiotics. Neomycin was not included in the clinical trials, but will be tested at some future time. This antibiotic is too toxic for parenteral administration, but is not absorbed when given orally and is safe when administered this way. At present, it is too expensive to allow its routine use, but it is possible that a shorter course of therapy than we have employed in using chloramphenicol may be sufficient.

Tetracycline and its derivatives have been disappointing in the treatment of shigella and salmonella enteritis. In our previous series⁵ oxytetracycline was less effective than chloramphenicol in treating these infections. In the present *in vitro* tests, the majority of cultures were very poorly sensitive to tetracycline, especially the salmonellae, 72% of which were completely resistant to this antibiotic. These findings have been in contrast to those of other workers^{10, 11} who found chlortetracycline, oxytetracycline and tetracycline effective particularly in the shigella dysenteries.

Sulphatriad did not inhibit the growth of shigellae and salmonellae in our *in vitro* tests, 96% and 100% of these cultures, respectively, being completely resistant. Sulphonamides are still very commonly used in the treatment of gastroenteritis, but it appears rather pointless to do so where a high proportion of these cases are due to shigella and salmonella infections, particularly in view of the not inconsiderable toxic effects of these chemotherapeutic agents.

It thus appears from this investigation that chloromycetin is the antibiotic of choice in the treatment of shigella and salmonella enteritis and that neomycin warrants further investigation in their treatment.

SUMMARY

In vitro sensitivity tests were carried out on 92 cultures of shigellae and 53 of salmonellae, using chloramphenicol, streptomycin, neomycin, tetracycline and sulphatriad.

The findings of the *in vitro* tests are contrasted with the results of treatment of 116 patients with shigella and salmonella enteritis, using chloramphenicol and oral streptomycin.

Chloramphenicol was effective, both *in vitro* and *in vivo*. Streptomycin was effective *in vitro* but relatively ineffective *in vivo*. *In vitro* shigella and salmonella sensitivity to neomycin was good, but was very poor to tetracycline and sulphatriad.

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Cassel and Dr. J. Metz of the South African Institute for Medical Research, for help in the preparation of this paper. We also wish to thank Dr. I. Frack, Medical Superintendent, Baragwanath Hospital, for permission to publish this report.

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AN UNUSUAL OBSTETRIC CASE

M. SEGAL, M.Sc., M.B., B.Ch., Springs, Transvaal

For the onset of menstruation to be delayed until the age of 33 is most unusual; even more remarkable is the occurrence of pregnancy 2 years later. The following is the history of this case.

Mrs. A.S.T., aged 35, was first seen by me on 12 August 1958, complaining of a haemorrhagic vaginal discharge and indigestion. She had felt quite well until approximately 3 months previously, when she began to suffer from heartburn and nausea. A barium-meal examination was done, but the findings were normal. She was able to take a light breakfast, but could only tolerate milk for the rest of the day. Despite this restricted diet her weight increased. In addition she had a slight haemorrhagic vaginal discharge, which had appeared irregularly for the past few months, but was not troubling her at the time.

Questioned about her menstrual history she stated that she had never menstruated until the age of 33, 2 years ago. Whilst a student nurse she had an episode of abdominal pain which necessitated laparotomy and she had been told that her uterus was very underdeveloped (see below). No other pathological condition was found. In 1956, whilst in Rhodesia, she was given courses of stilboestrol therapy—she volunteered that this was the drug used—taking this preparation for periods of 6 weeks, then omitting it for 2 weeks. This she did for 18 months. Her menses commenced during this treatment and continued after it was stopped, lasting 3 days, with an intermenstrual period of 28-35 days. For the past few months her menses had been replaced by the haemorrhagic discharge.

On examination, the patient, who was of average height and slender build, was found to be approximately 24-weeks pregnant. Speculum examination did not show any cause for the bleeding. There were also no obvious signs of endocrine dysfunction. The information that she was pregnant came as a great surprise to her.

Realizing that her history, as given above, was somewhat indefinite on certain points, I questioned her more closely, but could elicit no clearer story—only the additional information that she had been married twice; first at the age of 19 for a period of 4 years, then to her present husband since 1949. An interview was arranged with him and he corroborated her story. He is the same age as she, of very good intelligence, holding a responsible technical position on a mine. The patient is of average intelligence.

The subsequent history was unfortunate. Treatment was given for the dyspepsia and the usual antenatal care commenced. On 23 August there was a slight vaginal haemorrhage, which ceased the same day with rest. This recurred on 4 September,

now associated with moderate abdominal pains. She went to bed and called me the next day. The pains were now more severe, the bleeding slightly more, but not alarming. She was admitted to hospital, where on 7 September, despite fairly intensive sedation, she gave birth to a live female infant, weighing 2 lb. 6 oz. The placenta, however, did not deliver spontaneously and after a period of waiting, with indications of possible excessive blood loss, manual removal was carried out. As had been suspected from the previous bleedings, it was a lateral placenta praevia. The patient's progress was uneventful, but the infant lived only 1 week.

Comment

When my interest had been aroused by the exceptional history, I wrote to the surgeon who had carried out the laparotomy. He replied: 'I certainly remember Miss . . . (as she then was) . . . I found an infantile uterus, tubes and ? ovaries . . . I would never have believed pregnancy possible.'

I further addressed a letter to the Editor of *The Practitioner* asking for the comment of any of the panel of experts who contribute to that journal's 'Notes and Queries' section. The following is his reply:

'Thank you for your letter. I referred this to Dr. Peter Bishop, who is author of 'Recent Advances in Endocrinology' and probably knows more about the subject than anyone else in this country, and this is what he says:

'I would have thought that this was a most unusual story and indeed it is certainly one of which I have never heard myself before. I know of girls who do not menstruate before 18 or 21 and then start to have perfectly regular periods.

'I do not have much faith in stilboestrol as a method of inducing spontaneous cycles, and I would have thought that in this case the stilboestrol therapy was probably not the cause of the stimulation of the ovarian activities.

'I am afraid I do not know of any literature on this subject; indeed I am at present engaged in writing a book on gynaecological endocrinology and I am astonished how scanty is the literature on the subject.'

I am extremely grateful to Dr. William A. R. Thomson, Editor of *The Practitioner*, London, and to Dr. Clifford Thomson, of Johannesburg, for their very prompt and most helpful replies to my queries about this case.

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South African Medical Journal : Suid-Afrikaanse Tydskrif vir Geneeskunde

EDITORIAL : VAN DIE REDAKSIE

THE GENERAL PRACTITIONER AND THE FAMILY DOCTOR

The fundamental importance of the general practitioner in the scheme of medical practice is now generally appreciated and there is a general desire to see his status maintained and improved. The steps that are now being taken¹⁻⁴ towards the establishment of a South African College of General Practitioners will therefore be welcomed.

The question arises whether the general practitioner can be integrated with hospital services. In rural areas he inevitably remains in charge of his patient when admitted to hospital. Continuity of care by the same doctor, especially if he is the family doctor, has obvious advantages to the patient. In urban areas, however, with large hospitals, the position is different, and the patient's need for continuity of care must give way to the more urgent need for medical attention by specialists and for smooth administration of the hospital.

Here the general practitioner fades out of the picture, at least temporarily, when the patient is admitted to hospital, and it is therefore refreshing to read the description⁵ by two paediatricians, Brimblecombe (of Exeter) and Lightwood (of London) of a scheme whereby the general practitioner and his patient can have the advantage of consultation by the hospital specialist and nursing assistance from the hospital while the patient remains at home. This scheme achieves continuity in the care of the patient, retains the interest and active participation of the general practitioner, provides specialist consultant and laboratory facilities in the patient's home, and results in substantial economy in beds and cost of hospital services. It merits consideration in all South African cities. The difficulties inherent in the collaboration of various agencies and authorities should not be insurmountable, and the benefit that would accrue to patient, doctor and taxpayer is obvious.

The family doctor alone is in a position to relate an illness to the background of the patient; he alone appreciates to what extent the recommendations of hospital specialists are practicable in the patient's environment at home and

at work—for instance who shall give the insulin or who test the urine—; he is in the best position to judge concerning the likelihood of the disease to recur, or to occur in other members of the family; and he alone is able to apply preventive measures in relation to the individuals concerned.

The family doctor and the nurse are the health workers with the easiest and closest access to people, and 'these two operators in the field of family and social life are much more important than armies of psychiatrists and general physicians'. The health of the individual, and thus of the community as a whole, is much dependent on their efforts.

For these tasks the average medical practitioner is not adequately prepared. A study of the book edited by Malleon⁵ (reviewed at p. 1181 of this issue of the *Journal*) will be of value to all medical practitioners and is likely to be of great benefit to their patients. The social aspects of medical practice also call for serious consideration by those responsible for the training of medical students. A patient should not be treated as a 'machine sent for repair' and it is the duty of the hospital teaching staff—although a difficult duty for many specialists—to direct the attention of the medical student to the everyday problems of family practice.

In a chapter of this book, Evans describes the functions of the family doctor, as distinct from the general practitioner. The family doctor is the person 'to whom any member of a given family, of whatever generation, automatically turns for help in times of trouble'. It is often stated that the family doctor, as the trusted and esteemed family adviser, is largely a thing of the past. This is by no means wholly true; and the need for the family doctor is as great as ever. It remains an important function of the enlightened general practitioner to fill the role of the family doctor.

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PUBLIEKE BYDRAES VIR OORSESE BEHANDELING

Gedurende die laaste aantal jare het dit herhaaldelike kere voorgekom dat openbare lyste geopen word met die doel om pasiënte oorsee te stuur vir mediese behandeling. Teen die feit dat 'n pasiënt oorsee gaan vir behandeling as hy dit in hierdie land nie kan ontvang nie of as hy dit kan bekostig om te gaan, bestaan daar natuurlik geen beswaar nie. Trouens, die mediese professie self sou so 'n stap aanmoedig en nodige reëlings daarvoor tref.

Daar bestaan egter tog bedenkinge in hierdie verband, en wel om die volgende redes: In die eerste plaas gebeur dit soms dat publieke insamelings gedoen word om 'n pasiënt

vir behandeling oorsee te stuur terwyl die pasiënt die behandeling net so goed hier kan ontvang. Hierdie beginsel is ongesond en lei tot onnodige verspilling van die geld van die publiek.

In die tweede plaas—en dit is eintlik die ernstigste oorgeweging—word groot somme geld soms ingesamel om pasiënte wat aan ongeneeslike kwale ly oorsee te stuur. Optrede van hierdie aard lei nie net tot onnodige verspilling nie, maar tot groot teleurstelling en verdriet omdat dit valse hoop wek by die pasiënt en by sy verwante.

'n Derde beswaar is dat die besluit om pasiënte oorsee

te stuur so dikwels nie deur mense geneem word wat bevoeg is om dit te doen nie. Welmenende persone besluit soms op sentimentele gronde alleen om sulke openbare insamelings te doen om pasiënte oorsee te stuur.

Aangesien die Mediese Vereniging reeds lank al besorgd is oor hierdie toestand van sake, is die probleem by geleentheid van die laaste Federale Raadsvergadering volledig bespreek. Die verteenwoordigers van die mediese professie wat die saak by die vergadering van die Federale Raad bespreek het, voel dat die saak in alle eerlikheid en opregtheid benader moet word om die pasiënte, die publiek en die mediese professie self te help, maar ook te beskerm. Geen kans op herstel moet aan iemand ontsê word nie.

Maar valse hoop behoort nie gewek te word op die gronde van onbesonne optrede nie.

Om dus aan almal wat by 'n saak soos hierdie betrokke mag wees reg te laat geskied, het die Federale Raad van die Mediese Vereniging van Suid-Afrika besluit om vertoë tot die Minister van Justisie te rig en hom te versoek om opdrag aan magistrade te gee om nie verlof toe te staan vir die insameling van gelde om pasiënte oorsee te stuur nie tensy sulke openbare insamelings deur geregistreerde welsynsorganisasies gehanteer word sodat die saak deeglik ondersoek is met samewerking van die mediese professie. Die bedoeling van die mediese professie is dus nie om negatief op te tree en pasiënte moontlike herstelkanse te ontnem nie, maar om raad en advies te gee en saam te werk om 'n praktyk wat dreig om vrugtelos en skadelik te wees, te voorkom.

PENETRATING WOUNDS OF THE LARGE BOWEL

J. A. MYBURGH, M.B., CH.B. (CAPE TOWN), F.R.C.S., *Johannesburg General Hospital and University of the Witwatersrand*

Penetrating abdominal wounds still carry a considerable mortality. The 2 most important factors contributing to this mortality are shock due to haemorrhage, and sepsis. Sloan¹ analysed 146 civilian cases seen at the Johns Hopkins Hospital from 1925 to 1943. In the period 1925-38 the mortality was 31%, as compared with 10.1% in the period 1939-43, when sulphonamide therapy was available and the importance of adequate transfusion in these cases was more fully appreciated.

In addition, as Sir Gordon Gordon-Taylor² has pointed out in a masterly contribution to the subject, there are important differences between military and civilian cases which account for the higher mortality in the former. Factors to be considered in this connection include the explosive effect of missiles (which account for the vast majority of military wounds in contradistinction to those seen in civilian practice), the inevitable delays in treatment and the constant threat of infection, which are more significant in battle injuries.

The surgical management of injuries to most abdominal viscera has been standardized to a fair degree. Injuries to the large bowel are of considerable interest, not only because of their notorious mortality, but also because there is a difference of opinion regarding the best way of dealing with them. Gordon-Taylor² states that the routine use of exteriorization of colonic injuries was one of the great advances in the abdominal surgery of World War II. Handfield-Jones³ states that the method of exteriorization was the 'greatest single contributory factor to the improved results in colonic injury'. However, Gordon-Taylor² also states that with considerable experience and careful judgment there is a place in minor wounds of the large bowel, especially of the right colon, for more conservative measures, e.g. simple suture with or without a proximal diverting colostomy. It will, therefore, be instructive to analyse the methods used, and the results obtained, in treating large-bowel injuries in a civilian hospital which receives a relatively large number of these cases.

CASE MATERIAL

During the 3-year period 1954-56, 27 cases with penetrating abdominal wounds admitted to the Coronation Hospital

were found to have involvement of the large bowel with or without coincident injuries to other abdominal viscera. The relevant details of these cases are presented in Table I.

Age and sex incidence. As may be expected, the majority of patients were young, healthy adults. Ten cases occurred between the ages of 20 and 29 years, and 10 cases between 30 and 39 years. There were 3 cases under 20 years and 4 cases over 40 years of age. All the patients were males.

Nature of injury. There were 22 stab wounds and 5 gunshot wounds. The 4 fatal cases sustained stab wounds whereas the patients with gunshot wounds all survived. One cannot draw statistical conclusions from 5 cases, but it is noted that Sloan¹ found a much higher mortality in gunshot wounds in a series of civilian cases in which stab wounds and gunshot wounds were approximately equal in number.

Section of large bowel involved. The transverse colon (18 cases) was most frequently involved. The descending colon was involved in 6 cases, the caecum in 2 cases, and the sigmoid and rectum in 1 case each.

Treatment

Intravenous infusion was started in every case before operation, regardless of the clinical condition of the patient. A naso-gastric tube was passed, the stomach emptied and the tube left *in situ* because alcohol was a complicating factor in many cases. Whereas the necessity of early, vigorous and adequate blood transfusion in cases with haemorrhagic shock is fully appreciated, it must be emphasized that in the presence of evidence of continuing severe bleeding, preliminary transfusion must not be continued too long in the hope of getting the patient 'fit' for operation. In haemorrhage of this magnitude, the bleeding points must be secured as soon as possible, and resuscitation must proceed *pari passu* with the operation.

The administration of antibiotics, usually a combination of penicillin and streptomycin, was started pre-operatively in every case.

All the operations were performed by the surgical registrars on emergency duty. The need for adequate access in these cases is reflected in the choice of incision used. Paramedian incisions were used in 16 cases, transverse incisions

TABLE I. RESUME OF RELEVANT DETAILS

<i>Case</i>	<i>Age, Sex</i>	<i>Mode of injury</i>	<i>Portion of large bowel affected</i>	<i>Treatment</i>	<i>Other abdominal viscera affected</i>	<i>Extra-abdominal injuries</i>	<i>Complications</i>	<i>Length of stay in hospital</i>	<i>Final outcome</i>
1	M 20	Gunshot wound	Sigmoid 1 perforation	Simple suture	13 perforations in small bowel	Nil	Small bowel faecal fistula	7 weeks (readmitted for closure of fistula)	Full recovery
2	M 27	Stab	Rectum 1 perforation	Colostomy and drainage of buttock wound	Nil	Penetrating stab of chest	Haemothorax and empyema	4 months	Full recovery
3	M 16	Stab	Transverse colon 2 perforations	Simple suture	2 perforations of jejunum	Penetrating stab of chest	Transient bizarre hemiparesis	7 weeks	Full recovery
4	M 33	Stab	Descending colon 1 perforation	Simple suture	2 perforations of ileum	Nil	Pyrexial for 14 days	21 days	Full recovery
5	M 36	Stab	Transverse colon 1 perforation	Simple suture	1 perforation of ileum	Nil	Slight wound sepsis	17 days	Full recovery
6	M 30	Stab	Transverse colon 1 perforation	Simple suture	Laceration of mesentery of small bowel	Nil	Pyrexial for 6 days	15 days	Full recovery
7	M 40	Stab	Transverse colon 1 perforation	Simple suture	Nil	Superficial laceration of chest	Pyrexial for 9 days	14 days	Full recovery
8	M 30	Stab	Transverse colon 2 perforations	Simple suture	Jejunum Diaphragm Omentum	Penetrating stab of chest	Haemothorax	12 days	Full recovery
9	M 34	Stab	Transverse colon 2 perforations	Simple suture	Transverse mesocolon Mesentery	Nil	Pyrexial for 12 days	22 days	Full recovery
10	M 31	Gunshot wound	Transverse colon 6 perforations	Simple suture	Nil	Nil	Pyrexial for 12 days	18 days	Full recovery
11	M 54	Stab	Transverse colon 1 perforation	Simple suture	1 perforation of ileum	Penetrating stab of chest	Haemothorax	12 days	Full recovery
12	M 18	Stab	Descending colon almost completely transected	Simple suture	Nil	Nil	Nil	10 days	Full recovery
13	M 29	Stab	Transverse colon 1 perforation	Simple suture	Lacerated spleen Splenectomy	Superficial lacerations	Nil	20 days	Full recovery
14	M 36	Stab	Descending colon 1 perforation	Simple suture	Ileum 2 perforations	Superficial chest laceration	Nil	12 days	Full recovery
15	M 29	Stab	Descending colon 2 perforations	Simple suture	Nil	Concussion Lacerated scalp	Ileus for 5 days	10 days	Full recovery
16	M 27	Stab	Caecum 2 perforations	Simple suture	Nil	Nil	Nil	12 days	Full recovery

TABLE I. RESUME OF RELEVANT DETAILS (Continued)

Case	Age, Sex	Mode of injury	Portion of large bowel affected	Treatment	Other abdominal viscera affected	Extra-abdominal injuries	Complications	Length of stay in hospital	Final outcome
17	M 29	Stab	Transverse colon 1 perforation	Simple suture	Nil	Nil	Nil	8 days	Full recovery
18	M 26	Gun-shot wound	Descending colon 2 perforations	Simple suture	Ileum 6 perforations Resected	Nil	Pyrexial for 14 days	20 days	Full recovery
19	M 22	Stab	Transverse colon 2 perforations	Simple suture	Ileum 4 perforations Mesentery	Nil	Superficial wound dehiscence	38 days	Full recovery
20	M 17	Gun-shot wound	Transverse colon 2 perforations	Simple suture	Kidney (sutured)	Nil	Superficial wound sepsis	13 days	Full recovery
21	M 33	Stab	Transverse colon 1 perforation	Simple suture	Nil	Penetrating stab of chest	Haemothorax	13 days	Full recovery
22	M 25	Stab	Transverse colon 1 perforation	Simple suture	Kidney Liver	Nil	Nil	9 days	Full recovery
23	M 34	Gun-shot wound	Transverse colon 2 perforations	Simple suture	Nil	Compound fracture of finger	Wound sepsis	15 days	Full recovery
24	M 30	Stab	Caecum (2) Transverse colon (3)	Transverse colon sutured. Caecum exteriorized	Small bowel (4)	Nil	Nil after 1st operation	—	Died 4 days after closure of caecostomy
25	M 45	Stab	Transverse colon 2 perforations	Simple suture	Ileum (1) Mesentery (severe haemorrhage)	Nil	—	—	Died on table
26	M 20	Stab	Transverse colon 1 perforation	Simple suture	Ileum (1) Mesentery (severe haemorrhage)	Nil	—	—	Died 24 hrs. post-op.
27	M 45	Stab	Transverse colon (1) Descending colon (1)	Simple suture	Kidney Massive retro-peritoneal haemorrhage	Penetrating stab of chest	—	—	Died 3 hrs. post-op.

in 4 cases, while the original wound was enlarged in only 3 cases. The latter incision has a small place in the treatment of these cases, especially in gunshot wounds for it may lead to severely restricted access unless the wound is close to the mid-line. In lower thoracic wounds penetrating the diaphragm, an abdomino-thoracic approach is usually the most convenient and this was used in case 20, where a through-and-through gunshot wound involving lung, kidney and the right half of transverse colon was conveniently dealt with through this incision.

In 25 of the 27 cases the wounds in the colon were merely sutured in 2 layers without any proximal diverting colostomy. The suture material used was not specified in every case, but in the majority a 2-layer closure was done, using chromic catgut for the all-coats layer and interrupted silk sutures

for the sero-muscular layer. The peritoneum was drained through a separate stab incision in the majority of cases. It must be noted that in several cases the wounds in the bowel were quite extensive, and in case 12 the descending colon was almost completely transected.

In the remaining 2 cases, 1 (case 2) had a wound of the buttock penetrating the rectum. A proximal diverting colostomy was performed and the buttock wound drained. The other (case 24) had 3 perforations of the transverse colon, which were sutured, as well as a through-and-through wound of the caecum, which was exteriorized as a caecostomy.

Post-operatively, naso-gastric suction and intravenous fluids were continued until the return of peristalsis. Antibiotics were administered until the patient was afebrile.

In a few cases a member of the tetracycline group was given intravenously if the response to penicillin and streptomycin was not satisfactory (see below).

MORTALITY

Of the 27 cases 4 died as a result of their injuries—a mortality of 14.8%. The fatal cases are considered in some detail:

Case 24

This patient, an African male aged 30, sustained a stab wound producing 3 perforations of the transverse colon and 4 perforations of the small bowel, all of which were sutured in 2 layers. In addition there was a through-and-through wound of the caecum, which was exteriorized as a caecostomy. He made a good recovery and 4 weeks later an extra-peritoneal closure of his caecostomy was made. He was never well after the latter operation, and he died on the 4th post-operative day. At autopsy, the repair of the caecostomy was found to be competent. An unexpected finding (the cause of death) was gangrene of a large part of the small bowel from 2½ feet above the ileo-caecal valve, as a result of herniation through a tear in the mesentery which must have been overlooked at the original operation.

Case 25

This patient, an African male aged 45, had a stab wound of the right side of the abdomen, with small and large bowel protruding from it. He was in a desperate condition, requiring vigorous blood transfusion through both arms. At operation there was brisk bleeding from the root of the mesentery, a large perforation in the ileum, and 2 large perforations in the transverse colon. The perforations were sutured. The bleeding from the root of the mesentery was uncontrollable and he died on the table in spite of all efforts to resuscitate him. Post-mortem examination did not disclose any other injuries and the cause of death was shock.

Case 26

This patient, an African male aged 20, sustained a stab wound in the right iliac fossa. Small bowel was protruding from the wound on admission. He was extremely shocked; his blood pressure was 60/0 mm. Hg. At laparotomy a large amount of blood was found in the peritoneal cavity. One perforation in the ileum and another in the transverse colon were sutured. There was a large haematoma in the mesentery of the small bowel. At the conclusion of the operation the bleeding from this site appeared to be controlled, but a few hours later he showed signs of further haemorrhage, and died before anything could be done. At autopsy, an incision in the main trunk of the superior mesenteric artery, about 4 inches from its origin, was found. There was a massive retro-peritoneal haematoma, and about 1,000 ml. of blood in the peritoneal cavity. The cause of death was shock.

Case 27

This patient, an African male aged 45, was admitted with a stab wound in the left side of the abdomen. Bowel was protruding from the wound. There was also a stab wound in the left chest at the level of the tenth rib, with the physical signs of a haemothorax. He was very shocked. At operation, 2 perforations in the transverse colon were sutured. There was much bleeding from the retro-peritoneal space. He required vigorous resuscitation during and after the operation, and he died 3 hours after returning to the ward. At autopsy, there was a penetrating wound of his left lung with 300 ml. of blood in the pleural cavity. The sutured wounds of the transverse colon were satisfactory. There was a ½-inch incised wound of the left kidney surrounded by a large haematoma. The cause of death was shock.

Comment

In this series shock was the most important cause of death. In none of the cases was the cause of death directly related to the colonic injury, or the method of dealing with it.

Comparing these figures with the figures for battle casualties, the markedly lower mortality is obvious. During World War I, the mortality for large-bowel injuries was

48.7% (Cuthbert Wallace). For World War II, according to Gordon-Taylor,² the mortality ranged from 10% in small, solitary wounds to 70% in large or multiple wounds (total mortality in the region of 40%). According to Gordon-Taylor,² the greatest single factor in reducing the mortality was the policy of routine exteriorization. His mortality rate in a large series was 20-30%. Ogilvie,⁴ reporting from the western desert, found the mortality for colonic injuries to be 51.5%. When uncomplicated by severe extra-abdominal injuries, the mortality was 43.9%. If the operation was performed within 12 hours of wounding the mortality was 40%. Unfortunately the time interval between the wounding and operation in the Johannesburg series reported in this article was available from only few of the records, so that no comparison can be made, but it is virtually certain that the interval was much less than 12 hours in the vast majority of cases.

COMPLICATIONS

1. *Pyrexia.* The majority of patients ran a temperature for a few days, and in 6 cases it was sufficiently prolonged to be noted as a complication. The duration of the pyrexia in these cases ranged from 6 to 15 days. In 3 cases the routine administration of penicillin and streptomycin was discontinued in favour of a tetracycline preparation.

2. *Wound sepsis.* Mild wound sepsis was noted in 3 cases. In case 19 a more severe degree of wound infection caused dehiscence of the superficial layers, a complication which kept the patient in hospital for 38 days.

3. *Paralytic ileus.* In 1 case only (case 15) was the post-operative ileus of any significant duration. He required naso-gastric suction and intravenous fluids for 5 days, after which he passed flatus, made a rapid recovery, and was discharged on the 10th post-operative day.

4. *Faecal fistula.* A faecal fistula developed in case 1. He had received a gunshot wound in the left iliac fossa. This produced 13 perforations in the small bowel and 1 perforation in the sigmoid colon. The peritoneal cavity was drained for 5 days. The fistula kept him in hospital for 7 weeks, after which the discharge was so small in amount that he was allowed to go home in the hope that the fistula would close spontaneously. However, this did not happen, and the abdomen was re-explored 3 months after the original injury. The fistula was found to lead down to a loop of small bowel. It was excised and he made an uninterrupted recovery.

5. *Pulmonary complications.* Apart from the 6 cases with coincident penetrating wounds of the chest (see below) pulmonary complications were strikingly few. Breathing exercises, early ambulation and the comparative youth of the patients probably contributed to this state of affairs.

One patient (case 3) developed a bizarre unilateral weakness, the cause of which was never determined and which disappeared spontaneously in the course of a few weeks.

Length of Stay in Hospital

Only 4 patients had to stay in hospital for prolonged periods. In case 1 a faecal fistula developed (7 weeks and a readmission); in case 2 a thoracic empyema developed owing to a coincident penetrating stab wound of the chest (4 months); in case 3 a transient and unexplained hemiparesis developed (7 weeks), and case 19 suffered from a superficial disruption of his wound (38 days). In the re-

mainder the average stay in hospital was 14 days. This is an important factor if one considers the length of stay that would have been required if the procedures had been carried out in stages for all the patients.

Injuries to Other Abdominal Viscera

Coincident injury to other abdominal viscera has an important bearing on the mortality figures. Ogilvie⁴ found that in colonic injuries unaccompanied by severe extra-abdominal trauma the mortality was 43.9%, whereas in cases in which the small bowel as well as colon had been perforated the mortality rose to 58.6%. In small-bowel plus rectal injuries the mortality was 71.4%.

1. *Small bowel.* In this series, 12 patients had combined small-bowel and large-bowel injuries. Of these patients 3 died but analysis of these cases does not indicate that the addition of small-bowel perforations had any direct bearing on the fatal outcome (cases 24, 25 and 26).

2. *Mesentery or omentum.* In the majority of penetrating abdominal wounds, perforations of the bowel wall seldom cause severe haemorrhage. Exsanguinating haemorrhage almost always comes from vessels in the mesentery or the retro-peritoneal space. In 7 cases there was severe mesenteric or retro-peritoneal bleeding, and 3 were fatal (mortality 43%). In 3 of the 4 fatal cases in the whole series exsanguinating haemorrhage was the direct cause of death (cases 25, 26 and 27).

3. *Spleen.* The spleen was lacerated in case 13. Splenectomy was performed and the patient made a good recovery.

4. *Kidney.* The kidney was injured in 3 cases (20, 22 and 27). The third patient died, and at autopsy a large peri-renal haematoma was found.

5. *Liver.* The liver was lacerated in only 1 case (22), in association with wounds of the transverse colon and kidney. The patient made a rapid and uninterrupted recovery.

Extra-abdominal Injuries

1. *Chest.* Six cases had penetrating wounds of the chest as well as of the abdomen. One (case 27) was fatal, and the chest injury—a penetrating wound of the lung with 300 ml. of blood in the pleural cavity—probably contributed to his death. In case 2 the traumatic haemothorax became infected—a very rare complication in this hospital of an extremely common injury—and the resulting empyema required rib resection. He was well on discharge after 4 months. In the remaining cases, the haemothoraces cleared up rapidly on the conservative treatment (non-aspiration) employed in this hospital.

The other extra-abdominal injuries were minor in character, and do not warrant detailed description. On the whole, therefore, extra-abdominal injuries in this series were not very serious. This is one reason why the civilian mortality tends to be less than the military mortality. Ogilvie⁴ found that severe extra-abdominal trauma raised the mortality of colonic injuries from 43.9% to 51.5%.

DISCUSSION

In contradistinction to the accepted method of exteriorizing penetrating injuries of the colon during World War II, 25 of the 27 cases reviewed here were treated by simple suture in 2 layers without proximal faecal diversion or exteriorization. The 5 gunshot wounds were treated in the

same way as the stab wounds. In no case was there any evidence of faecal leakage from the colonic wounds. In the only case of faecal fistula (case 1), the leakage was found on subsequent laparotomy to originate from the small bowel, which had been perforated in 13 places by a bullet. Of the fatal cases 3 (12%) died as the result of massive haemorrhage from severed mesenteric vessels.

Only 1 case was treated by proximal faecal diversion; he had a wound of the rectum below the peritoneal reflexion as a result of a stab in the buttock area. This seems to be the only reasonable form of treatment for wounds in this particular locality.

One case (24) was treated by exteriorizing a through-and-through wound of the caecum after suturing 3 further perforations in the transverse colon. The unfortunate complication which caused his death is described in detail above.

While Gordon-Taylor² and other authors are emphatic about the desirability of exteriorizing the majority of colonic injuries, they do recognize circumstances in which alternative procedures may be used, as follows:

1. *Suture alone.* According to Gordon-Taylor,² this is only indicated in minor wounds. His low mortality (20%) resulted from his use of this method in only highly selected cases, generally of a minor character. Imes⁵ found the same 'apparent paradox' in his mortality figures: 24% in 168 selected cases where the colon was sutured, and 35% in 945 cases where the colon was exteriorized. He used the same criteria for selection as Gordon-Taylor. In the present series, many of the injuries could not be described as minor, and in case 12 the descending colon was almost completely severed.

2. *Suture with proximal faecal diversion* is also of limited value according to Gordon-Taylor.² He feels that it may be used in minor wounds of the right colon and rectum. The colostomy should be made as close as possible to the perforation, and opened at once. He states that this procedure is only justified when exteriorization is difficult or impossible for mechanical reasons. The average mortality with this method he found to be 33%.

3. *Resection and anastomosis* should be avoided in war surgery whenever possible according to both Gordon-Taylor² and Imes.⁵ This procedure carries a consistently high mortality, in the region of 65%. It may be indicated, however, in massive wounds in the caecal area. In this area, exteriorization carries the real disadvantages of skin excoriation and trouble with fluid balance. Gordon-Taylor² feels that if exteriorization is needed here, an accompanying ileo-transverse anastomosis is probably indicated, for this diverts some ⅓ of the faecal stream from the skin.

In conclusion we may therefore say that exteriorization is the procedure of choice in the treatment of extensively damaged colonic segments, especially if the blood supply is questionable. Resection and anastomosis has a special place in the management of massive wounds in the caecal area. These conditions apply in many war injuries. On the other hand, in the vast majority of civilian cases with large-bowel injuries, where the injury is less extensive, where there is less delay in definitive treatment, and where sepsis is consequently a less potent factor, simple suture has proved itself eminently satisfactory and associated with far less morbidity.

SUMMARY

1. A review of 27 cases of penetrating abdominal wounds involving the large bowel is given. The patients were all civilians. The regime of treatment is described. Simple suture was performed in all but 2 cases.

2. Four patients died, giving a mortality of 14.8%. This compares favourably with the mortality of this type of injury in war time. The reasons for the difference are discussed.

3. Whereas, owing to the more extensive nature of the lesion and frequent delays before operation, exteriorization of the injured colon is frequently the procedure of choice under conditions of battle, simple suture is a safe procedure with little morbidity in the vast majority of civilian injuries. Here the lesion is frequently not so extensive, and early operation is usually possible.

4. The most important single factor, which contributed to the fatal outcome in 4 cases, was massive haemorrhage from mesenteric or retro-peritoneal vessels. Infection was not a serious complication, and there were no cases of leakage from the colonic wounds.

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PELVIC ABSCESS IN GYNAECOLOGICAL PRACTICE

A CLINICAL ANALYSIS OF 80 CONSECUTIVE CASES

H. J. H. CLAASSENS, M.B., Ch.B., M.MED. (O. & G.), M.R.C.O.G.*

Late Registrar, Division of Obstetrics and Gynaecology, University of Cape Town and Cape Provincial Administration

The ready response of inflammatory states to modern antibiotics has led to a feeling of security, if not complacency, by those who have to deal with these conditions. In marked contrast to this were the helplessness and anxiety of the doctor and the suffering of the patient, in the presence of severe inflammation, little more than a decade ago. It was surprising to find that the number of patients suffering from pelvic abscess admitted to the Gynaecological Unit of the Groote Schuur Hospital, did not appear to be decreasing significantly. In order to study this problem and to reflect its true significance in this modern age, I made a detailed study of each case admitted between January 1956 and June 1957. A total of 80 cases were collected, of which 71 were dealt with by me.

The term 'pelvic abscess' denotes an abscess in any part of the pelvis but not necessarily confined to the pelvis. Pyometra is usually excluded because it forms a separate entity. This series therefore comprises those abscesses which present initially or ultimately in the pouch of Douglas. It is generally agreed that the condition is mainly found among the lower socio-economic classes, and the present series is confined to this group. Johnson¹ states that 'reports in the literature (of abscesses) are apparently scarce despite the abundance of such cases which should have decreased since the advent of sulphanilamides and the antibiotics.' The Groote Schuur figures for 1946 and 1956 only partly bear out this statement while they illustrate the predominating occurrence at present of abscesses in the Coloured population. For instance in 1946 there were 881 gynaecological admissions (320 White, 505 Coloured and 56 Bantu), of which 40 were cases of acute pelvic infection, and 16 cases of pelvic abscess (1.8% of all admissions—2 White, 12 Coloured and 2 Bantu). Abscesses therefore constituted 0.62%, 2.4% and 7.6% of the total admissions in the various racial groups.

In 1956 the total admissions were 4,446 (1,912 Whites, 2,059 Coloured and 475 Bantu), of which 143 were cases of

acute pelvic infection (11, 113 and 19 respectively) and 54 (1.2%) cases of pelvic abscess (3, 46, 5); abscesses therefore now constituted 0.2%, 2.2% and 1% of all admissions in the various racial groups. It will be seen that the actual incidence of pelvic abscess has decreased by a third, from 1.8% to 1.2%, with the Coloured contribution virtually unchanged at 2.4% in 1946 and 2.2% in 1956.

The abscess developed in less than two weeks in 55 cases. In 4 cases only it started as an exacerbation of a chronic inflammatory state, in 2 of which it followed abortions 8 and

TABLE I. PELVIC ABSCESS (80 CASES). DURATION OF INFLAMMATORY SYMPTOMS BEFORE ADMISSION

1-3 days	..	9	2-3 weeks	..	8	1-2 years	..	2
4-7 days	..	18	4-8 weeks	..	6	3-10 years	..	2
8-10 days	..	18	9-12 weeks	..	5			
11-14 days	..	19	3-12 months	..	2			4
		55			21			

10 years before. Some patients developed abscesses with surprising rapidity, often even within a few days of the onset of the inflammatory state (Table I). In 42 cases (52.5%) no obvious cause for the inflammation was found, while in 38 cases the following factors in order of frequency were considered to have aetiological significance.

1. Childbirth or abortion, especially the criminal variety, resulted in acute inflammatory states with subsequent abscess. In 5 cases, and in milder states of infection, which subsequently became acute, in 5 cases.

2. Operative intervention was considered responsible in 4 cases (1 after total hysterectomy, 2 after diagnostic dilatation and curettage and 1 after cervical cautery) while 3 abscesses followed operations for ruptured tubal pregnancies.

3. Acute cervicitis (large erosion) and vaginitis were probably responsible in 2 and 3 cases respectively.

4. Contiguity with the alimentary tract was the responsible factor in 6 cases (diverticulitis in 2 cases, appendicitis in 2 cases and strongly suspected in another, and non-viable secondary abdominal pregnancy in 1 other case, who developed a *B. welchii* infection which led to an abscess.

* Now of Hammersmith Hospital, London.

5. Old-standing pelvic inflammatory states preceded 4 abscesses.

6. Investigation into infertility led to infection in one patient after a salpingogram, and in another after tubal insufflation following salpingostomy.

7. Probable blood spread in an unoperated ruptured tubal pregnancy with a large haematoma.

8. Radium insertion for cervical carcinoma (1 case).

In addition to these some other causes, not encountered in this series, are usually listed: intestinal perforation due to peptic ulcers, trauma or diverticulitis, rupture of the bladder with urinary extravasation, and primary or secondary peritonitis, in which Fowler's position may be of significance.

A mixed growth of organisms was cultured soon after the appearance of the abscess, or it was found that the abscess became sterile (55% of cases) if left a few days longer although the pus might still be extremely foul-smelling. Gonococci are stated by most authors to be the commonest organisms present. This claim is, however, not supported by a critical perusal of the bacteriological findings as reported in the literature, and it was not proved in any one of the present cases, probably because of the notorious difficulty in proving gonococcal origin even with the gonococcal complement-fixation test. This test was not used in Cape Town and no reference to it could be found in any other published series. Black³, however, is 'convinced' that gonococcal infection is always the cause of tubo-ovarian abscess. Johnson *et al.*, in their series of 93 abscesses, found no gonococci in 9 positive growths after 33 attempts and yet they consider gonococcal infection the aetiological factor in most cases. Altemeier² in almost 1,200 collected cases of ovarian and tubo-ovarian abscess found gonococci in 18%. According to Stern⁴ other rare organisms are pyocyanus, tetanus and actinomycosis, while Black states that 95 % of all tubo-ovarian abscesses are due to blood spread streptococci. Haultain⁵ found that of

occasionally throbbing or stabbing; usually it was persistently dull or sharp. Stern considers that an acute abscess with a swollen tube and peritoneal involvement may cause severe pain while chronic cases may have mild discomfort only, and that urinary upsets are often present. In this series dysuria alone or with frequency occurred in 50% of cases, while frequency alone was rare and retention occurred only once. Stern also considers that recurrent or chronic cases with scarring and adhesions may be more painful and that they may also experience menorrhagia, dysuria, backache, painful defaecation and general ill-health. Such cases may occasionally be deceptive. For instance, in the case of one patient who was admitted for myomectomy with typical symptoms a large abscess with 2½ pints of pus and a normal uterus were found; the abscess developed insidiously after cervical cauterization 3 months before.

Constipation occurred in 23% of cases, diarrhoea in 17% of cases, usually the very sick and toxic and only 4 cases with low fluctuant abscesses had loose mucous stools, probably due to the policy of early incision, while 10% had tenesmus. Vaginal discharge varied from profuse and offensive to scanty yellow or white; the discharge was often more profuse in the more chronic cases. The menses were unchanged in the majority (82.5%) of menstruating cases. Eleven patients were subject to prolonged menstrual bleeding for 1-3 months, 3 to scanty menses and 1 to amenorrhoea for 1 month, while 30% of all cases including 2 post-menopausal cases, had experienced non-menstrual vaginal bleeding. The significant feature here was that the inflammation had started during or immediately after the menses in 28 (45%) of the patients. This excludes the 10 non-menstruating cases (7 following childbirth, abortions or ectopic pregnancies, 2 post-menopausal and 1 post-hysterectomy).

TABLE II. ORGANISMS FOUND

Author	Description	Cases	Sterile	Gonococcus	Staph. or Strep.	E. Coli (or coliforms)	C. welchii	E. Coli + P. Aeruginosa	E. Coli + M. aureus	B. typhosus
Altemeier	Tubo-ovarian	25	2 (8%)		22					
Altemeier (collected)	Tubo-ovarian and Pyosalpinx	1,179	632 (53%)	212 (18%)	105 (9%)					
Jensen	Pelvic Abscess	328	89 (27%)		52* (16%)					
Present series	Pelvic Abscess	80	45 (55%)		15 (19%)	10 (12.5%)	1	3 10 (12.5%)	5	1

* Mixed bacteria 136 (45%).

84 cases of tubo-ovarian abscess, of which 54 were acute and 30 chronic, 22 were of tuberculous origin. In 60 of the present cases guinea-pig inoculation or Kirshner cultures were performed without a single positive result. In Table II organisms found in the present series are compared with those of Altemeier² and Jensen⁴.

Symptomatology

The symptoms depend on whether the condition was acute, chronic or recurrent and often the general state of toxicity was more prominent than the local one. Pain was the commonest feature, present in 96% of patients (95% in Johnson's series and 100% in Jensen's). The pain was only

Signs

The dictum pronounced by Jensen that 'there is usually a tender lower abdomen, often bilateral and perhaps localized, with usually a mass on one or both sides which occasionally fills both' usually held true. The mass may be entirely within or encroaching from outside the pelvis upon the fornices, especially the posterior one, and the size may vary from a capacity of 50 c.c. of pus to very large abscesses extending to the umbilicus. Tenderness and inflammatory oedema may mask the presence or size or fluctuation of an abscess. Greenhill⁷ advises needling and incision of the abscess as soon as it is suspected and not when fluctuation is obvious. Pus

will be present when the mass is palpable, long before the classical signs are apparent. This fact was confirmed in the present series. The author was often asked to see cases of suspected abscess only to find an abscess already well established. 32.5% of abscesses were not fluctuant at all when drained of varying quantities of pus; the rest were fluctuant. In 30 cases more than 1 pint of pus was drained (in 13 more than 2 pints), in 21 $\frac{1}{2}$ pint, and in 29 less than $\frac{1}{2}$ pint. Only 9 cases showed no marked tenderness on examination. Thirty-six cases were very toxic, 26 were moderately toxic, 13 showed little evidence of toxicity, and 5 were not toxic at all. The abscess was located in the posterior fornix only in 36 cases (45%), in the posterior as well as in the right fornix in 17, in the posterior and left fornix in 12, and in the posterior and bilateral fornices in 15. The consistency of the pus varied from inspissated to milky, its smell from foul smelling to odourless and its colour from creamy yellow to brown and frothy (*B. welchii* pus). No constancy was found between the type of pus and the size, duration or severity of the condition.

Investigations

While Stern holds that a high vaginal swab will reveal the organisms on culture, routine bacteriological studies and culture of cervical swab specimens in 50 cases failed to confirm this: 28 cases yielded no growth, 10 grew coliform bacilli (only 2 of these having this organism in the pus), 6 *Micrococcus pyogenes aureus* (2 had this organism, 2 aerobacters, 2 enterococci) and 2 *Streptococcus viridans* (all unrelated to the pus findings). In 38 of these cases the swab specimens had been taken before the start of antibiotic therapy, but in only 2 instances were the same organisms then found in the pus. The same 50 cases had catheter specimens of their urine examined and in only 8 were organisms found, usually coliform, but again there was no correlation to the pus findings.

The initial haemoglobin level was found to be less than 10.5 g. % (70%) in 15 cases, while several developed lower levels within a few days. This reading as well as the sedimentation rates and white-blood-cell counts were found too equivocal to be of any use in differentiating the 5 cases of ectopic pregnancies from abscesses. The results ranged from 15.70 mm. per hour (Westergren) and 15-22,000 cells per c.mm. in both conditions.

Chest X-ray photographs were taken in 31 cases with none showing lung pathology, but in one case symptomless tuberculous osteitis of a rib and of one humerus was found. Guinea-pig inoculations or Kirschner cultures were performed on the pus on 60 occasions with negative results, while serological tests for syphilis were positive in 5 out of 24 cases (20%). Barium enemata excluded diverticulitis in 5 cases over 40 years of age.

General Facts

Of the 80 patients 46 were under 30 years of age, 24 were between 31 and 40, 7 between 41 and 45, 2 were 49 and one was 60 years of age; and of the 77 patients in the child-bearing age, 13 had never been pregnant while 3 had had an abortion only. Drainage had been instituted on the day of admission in 41 cases, within 3 days in 7, between 4 and 7 days in 15 and between 1 and 2 weeks in 17. Delay usually occurred in patients with peritonitis, very acute inflammation, or severe toxicity. In some cases an abscess developed or became

apparent or gravitated posteriorly after a delay. However, in 9 cases the abscess was missed for several days. Antibiotics may mask the typical swinging temperature of pus which may be present after a day or two, e.g. a patient was admitted with pelvic peritonitis 2 days after a successful tubal insufflation performed 6 weeks after salpingostomy. Despite intensive antibiotic therapy a small right-sided mass developed after a few days and went on to a large mass which gravitated into the posterior fornix, all within 7 days. Then 2 pints of pus were drained, still without any swinging of the temperature.

Diagnosis

Careful history-taking and physical examination usually sufficed, but on 9 occasions it was necessary to do a colpopuncture (also known as cul-de-sac needling or puncture, or culdocentesis) in order to distinguish abscess formation from ruptured tubal pregnancy with pelvic haematoma (which condition may simulate an abscess), hydrosalpinx, ovarian cyst and infected dermoid cyst of the ovary with a large sympathetic serous collection in the pelvis. Laparotomy was performed in these patients.

Colpopuncture is a very safe procedure. Beacham and Beacham⁸ describe 500 cases in which it was performed in clinic rooms while Schultz⁹ (over 2,000 cases) states that 'bowel penetration is a quite harmless accident'; invariably small bowel is involved (20-30 instances in his series); that bleeding, although more serious, can be controlled by stitching or packing; and not only that no case of internal bleeding was noticed, but that no case of infection had been seen. Bremer¹⁰ found preliminary local anaesthesia with a dental syringe a satisfactory procedure in more than 100 cases, while I used a long thin needle or a syringe, without any anaesthesia, on 9 occasions for diagnostic purposes without any trouble. Furthermore, Schultz states that no harm follows the needling of parametritis in the absence of an abscess and that this may indeed be beneficial. This occurred in one case in this series. It is, however, important to follow the posterior mid-line closely when needling is carried out for fear of perforating the ureter or the uterine vessels.

TREATMENT AND ITS RESULTS

The following scheme has been evolved:

1. Prevention

Discharges and erosion should be treated effectively and aseptic technique used at childbirth, evacuation and curettages should be impeccable, surgery should be gentle with effective haemostasis, and as much blood as possible should be removed in cases of ectopic pregnancy.

2. Immediate Treatment

(a) General measures such as intravenous therapy may be indicated before drainage in the very toxic cases, or good diet and vitamins in the malnourished. Broad-spectrum antibiotics should be freely used because most organisms are sensitive to these drugs. Cervical bacteriological studies or routine sedimentation rates or white-cell counts do not seem justified but chest X-rays and serological tests for syphilis should be used as a routine.

(b) While Stern suggests that conservative therapy may be tried for a few days with small collections of pus, 5 very toxic cases showed dramatic improvement after drainage of

50 c.c. of pus. This suggests that drainage should be instituted as soon as possible. Colpotomy or mid-line incision in the posterior fornix should be performed *as soon as* a mass is suspected there or reaches it from elsewhere in the pelvis or abdomen. It is unnecessary to await fluctuation, and light anaesthesia usually suffices. This policy of early drainage failed only once when an acutely tender patient was found to have a retroverted uterus and no abscess. It may have dramatic results, as in the 2 cases (one an uncontrollable diabetic) who were thought to have parametric thickening only but yielded 2 pints of pus each, without any fluctuation being felt at all. It is important to break down loculi with

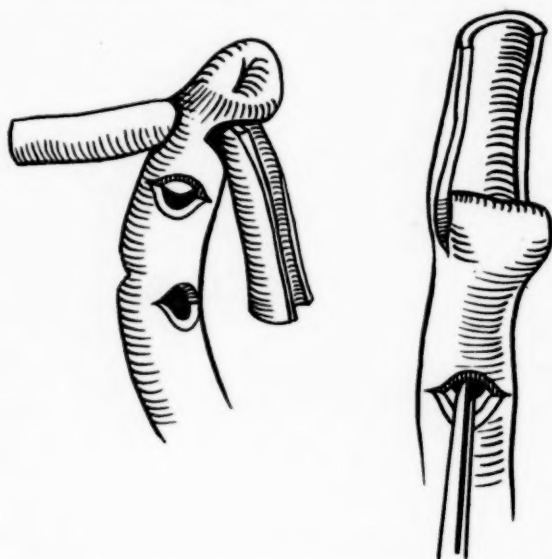


Fig. 1. A pelvic drain made from soft rubber tubing (on the right) with an artery forceps pulling through one flange. The completed drain is easily inserted, is effective, may be removed by a simple pull and can be cut off flush with the vulva.

the finger, otherwise drainage may be valueless, and to insert a drain of some description (Fig. 1), although Stern considers this unnecessary. It was found impossible to recognize organs with the finger in the abscess cavity.

Tupper¹¹ simply aspirated the abscess and injected penicillin and streptomycin up to 3 times in 14 cases; only 2 cases required subsequent surgery. Collins and Tucker¹² injected streptokinase and streptodornase through the drainage tube daily for 4 days in 11 cases. The propounders of both methods claim shorter stay in hospital for patients, but neither method was used in this series. When the abscess is anterior to the cervix abdominal drainage is indicated by a small incision over the mass with simple drainage, bilateral if necessary, as advocated by Stern. There were 2 such cases and although neither showed fluctuation, both yielded about 2 pints of pus. One developed from a slight thickening in the anterior fornix to a full-blown abscess in 6 days, while at operation a salpingogram done experimentally showed normal tubes. The other had a

concurrent laparotomy for volvulus due to adhesions caused by the abscess, but the patient subsequently died—one of the 2 deaths in this series. Conservative treatment in saving the fallopian tubes in such cases may be rewarding. One knows of at least one patient in whose case bilateral tubo-ovarian abscesses were found at laparotomy, who became pregnant within 4 months after discharge. Broad-ligament abscesses, which are very rare, may be drained extraperitoneally.

(c) Complications should be prevented or treated if already present. Instances of such complications are an anaesthetic or operation on toxic patients, broad-ligament abscesses which point in the groin, buttock, renal area etc., and peritoneal abscesses which rupture into the rectum or bladder (this happened in one case in this series and it led to a self-cure) or into the peritoneal cavity, which may be catastrophic unless recognized early. Early recognition may, however, be very difficult in an already very toxic patient. Stern advocates simple suprapubic drainage in such circumstances, while American authors¹³⁻¹⁶ advocate removal of all the pelvic organs. While no such case was encountered in this series, I feel that the latter view is possibly too radical in these days of antibiotic and intravenous therapy. Finally, the development of the state of 'chronic pelvic infection', of long-continued ill-health and of misery should be prevented as far as possible. In this connection Hurtig's so-called 'combined treatment' with the anti-inflammatory cortical steroids and proved specific antibiotics in resistant or recurrent pelvic infections, is of great interest.¹⁷ Dramatic results are claimed though Hurtig emphasizes the preliminary nature of his report and the fact that only specific antibiotics and not any broad-spectrum antibiotic should be used. One fails to see, however, how the sensitivity of organisms can be ascertained when they are localized and intra-abdominal. Further reports are awaited with interest.

3. Subsequent Treatment

(a) Chemotherapeutic 'cover' should probably be used during the next menstrual period; 5 patients had recurrences at that time, while 36 others had no known recurrences during a 5-day period under a covering course of sulphanilamides.

(b) Patients should be seen at regular intervals for the first few months after discharge to exclude and treat residual or recurrent pathology. Of the 34 patients that re-attended 5 had recurrent and persistent low-grade inflammation, 1 had an exacerbation of a probable appendix mass, 2 became pregnant soon afterwards, 4 had persistent adnexal thickening or parametritis and 2 others qualified ultimately for late surgery.

(c) Patients should be readmitted after about 3 months in order to exclude underlying tuberculosis in cases of obscure aetiology or of appendicitis if the mass had been right-sided. On investigation of 12 cases all were found to be normal with reference to X-ray examination, sedimentation rate, curettage, guinea-pig inoculation or Kirschner culture examination; 6 hystero-salpingograms were normal; 1 revealed a large residual hydrosalpinx (the patient eventually qualifying for late surgery) and 2 appendicectomies were performed. At these two operations, the organ in one case was still full of pus and oedematous; in the other it was fibrosed and adherent. Two other patients whose abscesses almost certainly originated in the appendix could not be examined because they failed to turn up for examination.

4. 'Late' Surgery

While there is on the whole a natural tendency towards improvement, especially at the time of the menopause, there is a definite group that may require late surgery. The indications, for surgery described by Haultain, are as follows: continued ill-health, constant misery with pain or menorrhagia, inability to work or to perform home duties adequately or to enjoy life. It is generally accepted that this group of patients need total removal of the pelvic organs. Two patients, in the present series, fell into this category; both were over 40 years of age. The Falk¹⁸ procedure of cornual resection should probably be reserved for cases with recurrent attacks where the pelvis is 'frozen' with adhesions as so often occurs in the Bantu. The procedure seems a successful one in such cases.

Mortality Rate

There were 2 deaths in this series. One has already been described and the other occurred in a very toxic patient with an abscess following a septic incomplete abortion, before drainage was instituted. Autopsy revealed septicaemic findings and multiple pelvic abscesses, mostly above the posterior fornix. The mortality rate therefore in the 80 patients was 2.5% compared with Johnson's 0.93% in 93 cases and Jensen's 5.7% in 328 cases.

CONCLUSIONS

1. While the exact aetiology in most cases of pelvic abscess remains obscure, the menstrual state seems to be of some significance, probably because the defensive cervical plug of mucus is washed away and the pooling of the menstrual flow with the endometrial slough may form a nidus for infection.
2. The incidence for all races treated in the Groote Schuur Hospital has decreased by a third in the past decade, but that for the Coloured patients remains virtually unchanged, namely 2% of all Coloured gynaecological admissions.
3. No correlation was found between organisms cultured from the cervix and from the pus. No proof of the gonococcal aetiology of abscesses could be found, although the necessary investigations demand an extremely difficult technique which was not employed in this series.
4. Inflammatory masses in the posterior fornix should be incised early without necessarily awaiting fluctuation, which may be masked by tenderness and inflammatory swelling.
5. Cases should be followed up regularly. The first period should be 'covered' with antibiotics and the cases readmitted after 3 months in order to exclude or treat possible underlying

conditions, e.g. tuberculosis or appendicitis. At this time routine appendicectomies are suggested for right-sided abscesses, because appendicitis cannot be excluded; it often tends to be recurrent and it can be safely cured.

6. The 'combined treatment' regime of Hurlig in recurrent or resistant cases is of great interest but the regime seems too experimental for general use at present.

7. A few selected cases may qualify for 'late' surgery. This should entail total removal of the female pelvic organs.

SUMMARY

A series of 80 cases of pelvic abscess, of which 71 were treated by the author, is analysed in detail and compared with other series reported in the literature. A scheme of treatment has been evolved and certain recommendations suggested, especially concerning the importance and value of the subsequent follow-up care of these patients, which has not been emphasized before.

SAMEVATTING

'n Reeks van 80 opeenvolgende gevalle van bekkenabses, waarvan 71 persoonlik behandel is, word ontleed en vergelyk met ander reekse en referate. 'n Plan van benadering, behandeling en nabehandeling word aangebied en veral word die belangrikheid en aanduidings van die bogenoemde plan van benadering, sover bekend, vir die eerste keer beklemtoon. Verskeie gevolgtrekkings word gemaak en bespreek.

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THE ROLE OF SEX IN HUMAN EVOLUTION *

M. R. DRENNAN, Professor-Emeritus of Anatomy, University of Cape Town

The literary star of Dr. C. Louis Leipoldt is in the ascendant and, as a poet, his name will always be remembered. What might be forgotten is that this great lover and pioneer of Afrikaans had a powerful and a fluent English pen, which he wielded for a lifetime in the cause of Medicine and for the advancement of the Medical Association of South Africa. It is fitting, therefore, that the Cape Western Branch of that Association should have decided to commemorate the medical activities of this great literary and wide-reaching mind. That the memorial should take the form of a medical lecture is also appropriate and would have pleased Leipoldt, because he wished always to be regarded as a

practising doctor, as well as being a writer on many subjects and the editor of a medical journal. He knew also full well that memorials in words can be as lasting as in stone.

That it should have fallen to me to be singled out from his contemporaries and friends to pay the first tribute in this form is a very great honour, and in expressing my grateful thanks for this compliment I trust that the subject I have chosen befits the occasion.

In publishing an earlier paper¹ of mine, Dr. Leipoldt wrote in an editorial 'Anthropology and Medicine are correlated sciences, and their interests overlap'. They certainly overlap in any discussion of the problem of sex in relationship to human evolution, because sex in all its manifold aspects obtrudes itself in medicine,

* C. Louis Leipoldt Memorial Lecture, Cape Western Branch of the Medical Association of South Africa (delivered at an open meeting), 14 October 1958.

and a consideration of sexual relationships and sex morphology is basic in anthropology. The evolutionary principle has also now crept into several branches of medicine, such as bacteriology and virology, and it is fundamental to biology and anthropology.

THE SCOPE OF THE SEX PROBLEM

The subject of sex is a protean one, and the books and articles that have been written on it are legion. It has a social side, and the rules and regulations governing sexual behaviour that have been evolved by different societies of mankind form the framework of their whole social structure. In individuals, sex is a many-sided phenomenon. The normal bisexual arrangement is manifested by the different anatomical structure of the male and female sex organs. This difference goes very deep, extending to the chromosomes and genes not only of the sex cells but of all the cells in the bodies of those of different sex. As a result of the presence of these curious little structures in the cellular make-up of the body the constitution of males and females is quite different.

Apart from the obvious physiological difference between the sexes in reproduction, males and females have a different glandular metabolism, and this internal chemical difference is reflected in a great number of different ways. Grouping the anatomical and physiological characteristics of the male as manifestations of 'masculinism' and those of the female as 'feminism', it is the object of this address to show how, by means of the sex mechanism, there has been an interplay between masculinism and feminism as part of the evolutionary machinery. In the animal world fierce masculinism has undoubtedly played the dominant role, whereas it would appear that in human evolution the refinements of feminism have been a major factor.

As deep-rooted as anything in biology is the sexual instinct, and a characteristic feature of different animals is their sexual behaviour. Man is no exception and in his case the psychological aspect of sex is probably the most important one.

Sex is without a doubt a great mental driving force, a sort of biological hunger in both males and females, and in all human societies social sanctions and taboos of one kind or another have been set up to regulate sex behaviour. Without the stimulating influence of sex the human mind could not have blossomed out in art, music and literature the way it has done. Can there be any doubt about the importance of sex as a creative factor in both social and organic evolution?

THE EVOLUTION OF SEX

For the beginnings of sexuality in animals we must look to the behaviour of unicellular organisms, such as some of the protozoa. These propagate themselves for the most part asexually, that is to say by a simple division of one cell into two new ones. Under appropriate conditions, however, two of the cells may come together and form one cell with a fusion of their nuclei and a doubling of the number of the chromosomes. Ultimately these 'fertilized' cells divide into two, each of the 'daughter' cells taking half of the combined chromosomes. In this way there arises a new rejuvenated generation of cells which continue to divide asexually. This simple process is worth emphasizing, because it foreshadows what happens in the higher animals, where male and female sex cells unite and form the body cells, which divide asexually as they grow to form the body.

In the next stage of evolution we get multicellular creatures with a differentiation of the structure and function of the cells to form the different tissues of the body. Thus there are skin, nerve, muscle, glandular and sex cells.

Gradually as we ascend the animal scale the sex cells become differentiated into male and female forms. The male sex cells develop into small and usually highly motile spermatozoa, whilst the female germ cells retain their cellular form and usually enlarge to form the ova or eggs.

In such forms as snails and slugs every individual has a single sex gland which produces both eggs and spermatozoa. Worms on the other hand have separate sex glands, that is to say testes and ovaries. They and many other invertebrates are therefore called hermaphrodites. Self-fertilization, which is so common in flowers, is, however, rare, and in these lower forms there is already a copulatory mechanism. This ensures that in fertilization there is a union of the sex cells of two different individuals. It should be noted, however, that in these hermaphrodites there is no detectable difference in the chromosomes of the male and

female sex cells. Their male and female parts are simply different organs of the same body.

In all the higher animals there is a separation of the sexes into males and females. This gives each species an opportunity for a division of labour in the interest of the species, for the male to be more active and to give protection, and for the female to be more passive and produce the eggs or the young. In some species the sexes look very different, whereas in others the males and females are outwardly hardly distinguishable. Examples of the former extreme sexual dimorphism are the peacock and the peahen, whereas the cock and hen pigeon are very much alike. Amongst the primates the skull of the male gorilla is very different from that of the female, so much so that the two sexes look as if they represented different species. This extreme differentiation gets less and less as we ascend from Ape to Man, until we come to the Bushman, where the skulls of males and females are indistinguishable.

It would seem then that just as the crossing of two interfertile species may give rise to a new species, so the 'crossing' of the two different sexes, that is to say of masculinism and feminism, probably played a very important part in human evolution.

SEX AS AN EVOLUTIONARY FACTOR

Darwin devoted much of his time and many of his writings to a study of the influence of sex on the evolutionary process. The key to the riddle of sex, however, was still denied to his generation, and he had only his own clear vision of what the human pedigree has turned out to be. Of particular importance to Darwin was the prodigality with which the germ cells, particularly the male ones, are produced, and the multiplicity of generations, because these were the means by which Nature increased her chances of producing those variations, which accumulate and lead to the formation of new species.

He also recognized the different environmental conditions to which males and females are subjected in the wild state. There the males have to develop special strength and ferocity, and have often to be literally armed to the teeth to catch their prey and cope with enemies from without. At the same time they have to be relatively better armed than their rivals within the species in order to win a mate. It is clearly for them a matter of 'the survival of the fittest'.

The female on the other hand has the protection of the male, and is practically in the same position as a domesticated animal. As a consequence the female is able to show a refinement of structure, a docility of temperament, and those maternal instincts which are so necessary for the rearing of her family.

But it is easy to see that in the wild state any transference of feminism to the anatomy or temperament of the male would lead to his elimination in the struggle for existence. On the other hand the position would be very different if selection value were given to feminism in the male, and that is very probably the means which prehistoric Man used to accomplish that greatest of biological achievements, namely the domestication of the various breeds of birds and animals. Other important factors, however, come into this process. For example, that most intelligent of creatures, the Indian elephant, is captured in a wild state, and it is tamed and trained by being brought into close contact with an elephant that has already been domesticated. This suggests that wild animals are not necessarily wild by instinct, but that they are educated in 'wildness', and can be just as readily educated in 'tamedness' by example.

There is a lesson in this which the human race can take to heart, because there is nothing to justify the belief that Man, for all the anatomical feminism which he appears to have, has shaken off much of his psychological masculinism. His civilized behaviour and general culture still depend largely on education by example, and that is particularly true in matters of sex.

There is a great deal to be said for the idea that it was by a process analogous to the domestication of animals that Man has, so to speak, domesticated himself. Having made the great discovery of the advantage of using weapons instead of teeth, he could afford to sacrifice his anatomical armaments, and replace his masculinism with the refinements of feminism.

Sexual Selection

Darwin credited the females of certain species with what amounts to conscious sexual discrimination, attributing the beauty of the sexual serenades of male birds, and the exquisite colouring of

the peacock's tail to the good artistic taste of generations of females.

There is no doubt that conscious sexual selection on the part of the human female, who is free to choose brain rather than or as well as brawn, has had a powerful influence on human evolution. It has not yet, however, been sufficiently stressed how the invention of weapons, besides benefiting Man, led at the same time to the anatomical and psychological emancipation of women. Now for the first time in evolution female anatomy acquired the same survival value as that of the male in the struggle for existence. It was as easy for the human female to strike a lethal blow with a club or dagger as it was for the male. She could go further, and by choosing a suitable partner she could transmit the refinements of her anatomy and temperament to her sons without prejudice to their survival. That this actually happened is suggested by the frequency with which degrees of feminism appear in the male at different stages of the human fossil pedigree.

Feminism or Gynomorphism in Human Evolution

The advance from Ape to Man has been characterized, on the one hand, by a gradual reduction of the size of the teeth, and, on the other, by a great enlargement of the brain. The usual explanation of this is that teeth, like all other structures tend to vary or mutate in size, and that by an economy of Nature smaller teeth were developed, because with the invention of weapons, they had as good survival value as bigger teeth used to have. But the appearance of smaller teeth in a subsequent generation need not be regarded as altogether a matter of chance. It can be explained equally well by regarding it as an example of feminism that is to say of the smaller female teeth of one generation appearing in the male of a second generation.

That this example of the alternation of feminism with masculinism is not confined to individuals is shown by the contrasting features of the two 'living fossil' races, namely, the South African and the Australian Bushman. As already mentioned, the South African Bushman skull is practically identical with that of the South African Bushwoman, and their teeth are the smallest in the human family. The Bushman could afford to be feminized anatomically, because he had the bow and poisoned arrow. On the other hand the Australian Bushwoman's skull is very similar to the coarse Neanderthaloid skull of the Australian Bushman, and their teeth are the largest still existing in the human family. The position therefore is that at the moment there is in actual existence one primitive race which has become completely feminized and another which has become completely masculinized.

An analogous feminist argument may be used to explain the gradual increase in size of the human brain, because the female brain, relative to the weight of her body, is always 10% heavier than that of the male. Moreover, the prolonged infantilism of the human child, which accounts for the great growth of the human brain relative to that of the ape, is feminist to the extent that it has been brought about by a gradual prolongation of the time which the human female takes to reach sexual maturity.

For an explanation of the evolutionary machinery by which male and female features have on the one hand been entrenched, and on the other banded about from sex to sex, it is necessary now to give some consideration to the meaning and mechanism of Sex itself.

THE MEANING AND MECHANISM OF SEX

Until the beginning of this century little was known about maleness or femaleness beyond their procreative purpose. There was the strange unflattering story of the creation of Eve from one of Adam's ribs, and complete darkness as to the origin of sex in other living creatures. Less well known, but much more plausible, because it can happen in butterflies, etc., was Plato's romantic myth that human beings were at one time male on one side and female on the other. Tradition had it that the gods became displeased with this eminently fair arrangement, and decided to sunder them apart as man and woman, who forever afterwards have been striving to regain their lost wholeness. Equally speculative were the so-called scientific theories about the meaning of sex that were current until little over fifty years ago.

The clearing up of the mystery of sex had to await the rediscovery in 1900 of the basic laws of inheritance, which had been worked out by Gregor Mendel, until then a forgotten contemporary of Darwin. This discovery has proved to be one of the greatest milestones in the history of biology, and it constitutes

the foundation of that new branch of science called genetics. The name derives from the fact that countless observations and experiments on the inheritance of different features in plants and animals have shown that this is controlled by ultra-minute genes situated on the chromosomes of the cell nuclei of different species.

One of the most important outcomes of this work has been the discovery that the inheritance of sex itself, and of the so-called sex-linked characters, is determined by genes, and conforms to Mendelian law. An elementary knowledge of the genetic mechanism of sex and of the early stages of development of the sex organs is therefore necessary for a proper understanding of the important part which sex seems to have played in evolution.

Chromosomes and Genes

All animals are built up of microscopical units called cells, and within the darker staining nucleus of each cell there are minute paired bodies called chromosomes, linked to which there are exceedingly minute genes. The number of chromosomes in each cell varies from species to species; in man it is 48, that is to say 24 pairs. During cell division the chromosomes look like tiny hieroglyphics or shorthand symbols, which indeed they are, since they and the genes they carry determine the features of the body such as the colour of the skin, hair and eyes, and also sex. The easiest pair to decipher is the sex pair, which are alike in the human female and are usually referred to as the XX pair, whereas in the male they differ and constitute the XY pair.

As the female germ cell or ovum matures it discards one-half of its chromosomes, including one of the Xs. On the other hand the mature male germ cell divides into two, each half containing half the chromosomes, and each becomes a motile spermatozoon, one taking the X- and the other the Y-chromosome. The chances whether an X- or a Y-spermatozoon fertilizes, that is to say gets inside the X-ovum, are equal. If an XX combination results, the sex of the child is female, whereas an XY combination results in a male.

Besides arranging for sex this machinery has also a provision for the crossing-over of genes from one member of each pair of chromosomes to the other member of that pair. In this way the genetic patterns of the male and female germ cells are shuffled like 4 packs of cards. As a result, the parental characters represented by the genes are distributed more or less at random, feature by feature, to the offspring. On the whole the 'deal' is a balanced 50-50 one, so that the general features of a race or stock are maintained unchanged. What seems hitherto to have been generally overlooked, however, from the evolutionary point of view is that there is at least one direction in which the deal is manipulated to the extent that it is known to which party certain genes must go.

Thus it is now known that genes which are attached to an X-chromosome must go the same way as this X-chromosome goes in the sex mechanism just described. For example a son gets his one and only X-chromosome from his mother, and he passes this same X-chromosome for certain to all his daughters. A daughter on the other hand gets one X-chromosome from her father and another from her mother, so that it is a matter of chance which of these Xs passes to her offspring. Medical men are familiar with this phenomenon in the inheritance of haemophilia and colour blindness. These peculiarities are sex-linked to the extent that the genes which are responsible for them are attached to an X-chromosome, and they are transmitted in conformity with the behaviour of the X-chromosome in sex determination.

However, the term 'sex-linked' which is applied to these defects is misleading, because they are only X-linked, and they can appear in both males and females. The only difference is in the proportions in which they crop up in the two sexes. The greater frequency of haemophilia in the male is due to the fact that when the gene for this condition is present on his X-chromosome, he inevitably manifests the condition, because there is no normal gene on his Y-chromosome to counteract it. On the other hand, when the gene for haemophilia is present on only one of the X-chromosomes of a female, as is usually the case, the normal gene on her other X-chromosome seems to counteract its morbid influence, so that she is not a 'bleeder'; she is what is called a 'carrier', because there is an even chance that she will transmit this morbid gene to her offspring. It is only in the rare event of there being a gene for haemophilia on both her X-chromosomes that a female becomes an actual bleeder.

This interesting type of inheritance has been stressed because it is not always morbid. Some of the most valuable genes in the body are in fact attached to or controlled by the X-chromosome. Animal breeders, for example, are well aware that a cow with a good pedigree and a good milking record is practically certain to transfer these valuable genetic qualities via her X-chromosome to the genetic make-up of her male offspring; hence the seemingly fantastic prices that are sometimes paid for pedigree bulls. The farmer knows that by using a good bull and exercising careful selection and a degree of inbreeding he can improve the quality of a herd in a very short time. States also know that with the practice of artificial insemination the breed of the whole cattle population of a country can be very quickly improved.

Mention must be made of another possible imbalance in connection with the distribution of the genes. It has been pointed out already that as the ovum prepares for fertilization it discards one-half of its chromosomes, including one of the Xs. This may be done at random, but it is quite possible that some subtle 'chemical selection' is exercised and that the ovum retains those genes which are or have become best adjusted to the chemical constitution of the maternal body. It will be shown later that the maternal hormones have a powerful influence over the genes of the embryo and there seems no reason why they should not alter the genes in the same way as radiation does. This is in conformity with the Lamarckian theory of evolution, a doctrine which was supported by Darwin and is still advocated today. It postulates that the individual in some way determines what is likely to be 'of use or of no use' to the species.

A somewhat analogous argument has been used in connection with the male germ cells to explain runs of males and runs of females in certain families. There it has been assumed that a greater adaptability and vitality of the Y-containing spermatozoa could account for a run of males, whilst a different kind of 'chemical selection' favouring the X-containing spermatozoa could be the explanation of a run of females.

It has been necessary to give this somewhat lengthy discussion to the imbalance in the sex mechanism, because just as we have seen how it can provide the machinery for creating new breeds of animals, so it is more than likely that it was by this same sex mechanism that the human race has been stepped up.

The Glandular Influence on Sex

The discussion of the sex mechanism has been confined so far to the behaviour of the sex or germ cells in relationship to fertilization and the determination of sex. Fundamental and decisive as this is, it is merely the beginning of the complicated process which has still to go on in order to differentiate the male and female body. Some consideration has therefore to be given to the way in which the single-cell ovum becomes the multicellular human body.

Immediately after fertilization the ovum divides into 2, 4, 8 etc. cells and forms the multicellular embryo. One of the earliest activities of these cells is to form structures which protect the embryo and attach it to the mother's womb. The chief of these structures is the placenta, whose function terminates at birth when it is destroyed as the 'afterbirth'.

The other cells form 3 layers from which the bones, muscles, nerves, bloodvessels, glands etc. of the body are formed. The most important of these from the point of view of sex and of survival are the sex organs, and in particular the sex glands—the testes and the ovaries. Other glands such as the pituitary, thyroid, and the suprarenals are also formed, and each of them begins to manufacture its own particular chemical product. Working in harmony they pour their internal secretions or hormones into the circulation, which carries them to all the organs in the body. They are the executive officers of the body, and their function is to see that the 'orders' of the genes are carried out. Thus they see that the sex apparatus, the size of the body, the colour of the hair, skin and eyes, are all developed according to the specifications of the genes. But, as we shall see presently, they don't always complete their job properly.

One of the most obvious examples of the effect of glandular activity is provided by the sex glands themselves, the testes and the ovaries. These become active at puberty, and their hormones are then responsible for what are called the secondary sexual characters. Their activity accounts for the breaking of the voice

and for the development of the breasts in the female and of the beard in the male.

The Genital Organs

One of the most remarkable features of development is the way in which the genital organs are formed. The astonishing thing about them is that the rudiments of both male and female genital organs appear in every individual. Not only that, but some of these are retained in vestigial form in the adult body. For example the male nipple represents the female breast, and the miniature uterus masculinus of the male represents the womb.

As to which of the two sets of genital organs is to be developed, there is no doubt that the decisive say rests with the genes which are on, and with those which are associated with, the sex chromosomes.

This dual nature of sex anatomy makes it easier to understand the all too frequent examples of the imperfect differentiation of sex resulting in anatomical abnormalities of the sex organs. In sex diagnosis these cases of pseudo-hermaphroditism or intersex present a problem to which the correct answer can only be arrived at after taking account of the genetic constitution of the cells of each case and of the other factors for sex that have been discussed above.

The question whether it is advisable or not to 'change the sex' of an individual, that is to say to correct a previous wrong diagnosis, frequently crops up, and requires careful consideration, especially if the case is that of a grown-up. The difficulty arises from the fact that many of these cases are quite happily adjusted to their wrong sex, so that it is better to leave well alone.

The classical example of the way in which the hormonal influences to which the foetus is subjected may upset the genetic determination of sex is provided by the 'free-martin' in cattle. This is a cow which as a calf shared a placenta, and therefore the blood, of a twin brother. As a result its constitution is so masculinized that it is sterile and shows male propensities.

Recently Wilkins *et al.*² reported a series of baby girls who were born in a masculinized condition because their mothers were treated with the female hormone, progesterone, while carrying them.

Interesting in a somatic direction as showing the influence of the mother's hormones on the genes is what happens when the small donkey species is crossed in different directions with the horse species. Although in both cases it is the same genes for smallness on the one hand and for bigness on the other that are involved, the resulting mule tends always to take the size of the mother. The same phenomenon is encountered in the canine world, where small bitches which have been accidentally mated with much bigger dogs don't necessarily have difficult confinements.

From the evolutionary point of view the importance of the anatomical duality of sex in each individual (referred to above) lies in the fact that it shows that sex is not an absolute but only a relative quantity. It explains why there are degrees of sex, why there are mannish women and effeminate men, and it goes a long way towards explaining the perversions of sexual behaviour.

That the imbalance in the mechanism of sex inheritance and the interplay between masculinism and feminism have also exercised an important influence on human evolution cannot, I submit, be doubted. The anatomical evidence of feminism is there, and I think we must agree with Darwin that the best in human emotional life is that part which came from those primitive maternal instincts that the female developed for the rearing of her family. Of course, however, it is not contended that anatomical feminism in the human male curbed to any great extent his inherent psychological masculinism. The coming of Man was not the end but merely the beginning of a different and equally cruel struggle for existence. We know the fierceness of the struggle which prehistoric Man had to contend with in defying the elements of heat and cold and in providing food for his family. History is a vast chronicle of successive wars, none the less bloody for having been sublimated into the priceless cultural shapes of literature, art and music.

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2. Wilkins, L., Jones, H. W. Jr., Holman, G. H. and Stempfel, R. S. Jr. (1958): *J. Clin. Endocr.*, 18, 559.

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PNEUMOCONIOSIS ACT, 1956

At the meeting of Federal Council held in Pretoria on 1-3 October 1958 Dr. J. H. Struthers, in his capacity of Chairman of the Parliamentary Committee, reported on representations made by the O.F.S. Gold Fields Division concerning the obligations which section 29 (2) of the Pneumoconiosis Act imposes upon the doctor who is attending a deceased person at the time of his death, if the deceased person has worked in a dusty atmosphere in a controlled mine, viz. to remove the cardio-respiratory organs and send them to the Pneumoconiosis Bureau for post-mortem examination.

In correspondence on the subject with Dr. P. D. Combrinck, the Association's Assistant Secretary (Transvaal), the Secretary for Mines stated that his Department could not support any representations for the payment of a fee for this service as was envisaged by the O.F.S. Gold Fields Division.

Federal Council resolved to take no action in this matter, which was again discussed by the Parliamentary Committee at its meeting on 17 November 1958 when, as not all medical practitioners might be aware of the obligations placed on them by the

Pneumoconiosis Act, the Committee resolved that through the medium of the *Journal* the attention of members should be drawn to section 29 (2) of the Act, which reads as follows:

'Section 29 (2): A medical practitioner in the Union or South West Africa who attended a deceased person at the time of such person's death, and who knows or has reason to believe that such person worked in a dusty atmosphere at a controlled mine, or any such medical practitioner who has opened the body of a deceased person and who knows or has reason to believe that such person worked in a dusty atmosphere at a controlled mine, shall remove the cardio-respiratory organs of the deceased and send the said organs to the bureau* or any other place specified by the director,† in accordance with any instructions which may be issued by or on behalf of the director.'

The attention of members is referred to a memorandum on this subject which was published in the *Journal* at page 898 of the issue of 6 September 1958.

* the Pneumoconiosis Bureau

† of the Pneumoconiosis Bureau.

OFFICIAL ANNOUNCEMENT : AMPTELIKE AANKONDIGING

MEDICAL AID SOCIETIES

Attention is drawn to the new address of the following society:
Northern Rhodesia European Civil Servants' Medical Aid Fund, P.O. Box R.W. 13, Ridgeway, Northern Rhodesia.

Cape Town
28 November 1958

L. M. Marchand
Associate Secretary

MEDIËSE HULPVERENIGINGS

Kennis word gegee van die nuwe adres van die volgende mediese hulpvereniging:

Northern Rhodesia European Civil Servants' Medical Aid Fund, Posbus R.W. 13, Ridgeway, Noord-Rhodesië.

Kaapstad
28 November 1958

L. M. Marchand
Medesekretaris

WELLCOME RESEARCH GRANTS

The Wellcome Trustees announce that among the grants sanctioned by them during the half year ended 31 August 1958 were the following:

Department of Anatomy, University of Birmingham. Up to £36,500 to extend the research laboratories and animal accommodation.

Department of Zoology, University of Edinburgh. Up to £25,000 to provide additional research accommodation.

University of Western Australia. £50,000 to endow a Wellcome Research Department of Pharmacology.

Institute of Medical Research, North Shore Hospital of Sydney, Australia. Up to £17,000 to build and equip laboratories for experimental medicine and surgery.

In addition, three electron microscopes are being purchased at a cost of approximately £34,000, for indefinite loan to the following institutions: The Biophysics Research Unit of the Medical Research Council, King's College, London (Prof. J. T. Randall, F.R.S.); Sir William Dunn School of Pathology, University of Oxford (Prof. Sir Howard Florey, F.R.S.); The London School of Hygiene and Tropical Medicine.

PASSING EVENTS : IN DIE VERBYGAAN

Research Forum, University of Cape Town. A meeting of Research Forum will be held on Wednesday 10 December at 12 noon in the large A-floor lecture theatre, Groote Schuur Hospital, Cape Town. Dr. A. S. Truswell will speak on 'Measurement of the nutritional value of proteins for human adults and the effect of the enrichment of maize proteins'. All interested are invited to attend.

Dr. E. Miller, Ophthalmic Surgeon, has moved from 205 Globe Buildings, Main Street, Port Elizabeth, to Suite 318/319, Barclays Bank Building, 60/64 Main Street, Port Elizabeth. Telephones: Rooms 22988, residence 28860.

Dr. E. Miller, Oogarts, het van Globegebou 205, Hoofstraat, Port Elizabeth, na Barclays Bank-gebou, Stel 318/319, Hoofstraat 60/64, Port Elizabeth getrek. Telefoon: Sprekkamers 22988, woning 28860.

Lede word herinner dat hulle die Sekretaris van die Mediese Vereniging van Suid-Afrika, Posbus 643, Kaapstad, sowel as die Registrateur van die Suid-Afrikaanse Mediese en Tandheelkundige Raad, Posbus 205, Pretoria, moet verwittig van enige adresverandering.

Versuim hiervan beteken dat die *Tydskrif* nie afgelewer kan word nie. Dít het betrekking op lede wat oorsê gaan sowel as dié wat binne die Unie van adres verander.

Dr. Frank A. Elliott, M.B., Ch.B. (Cape Town), F.R.C.P. (Lond.), of London, wishes to inform his colleagues and correspondents in South Africa that he is relinquishing his post as Neurologist at Charing Cross Hospital, London, to take up an appointment as Professor of Clinical Neurology in the Medical School of the University of Pennsylvania, and Director of Neurological Research and Education at the Pennsylvania Hospital, Philadelphia, USA.

Pneumoconiosis. After long preparatory international consultations an expert committee set up by the International Labour Organization (ILO) to report on the international classification of radiographs of pneumoconiosis met in Geneva from 27 October 1958 for 2 weeks. Professor Gernez-Rieux, Director of the Pasteur Institute, Lille, France, was elected chairman. The members come from 10 countries, viz. Belgium, France, Federal Republic

of Germany, Italy, Poland, Switzerland, Union of South Africa, the UK, the USA and the USSR. The South African representative on the committee is Prof. S. F. Oosthuizen.

International Congress of Gastro-enterology. The 6th Meeting of the Association of the National European and Mediterranean Societies of Gastro-enterology organized by the Association of Dutch Gastro-enterologists will be held in Leiden, the Netherlands on 20-24 April 1960. The main themes of the conference will be (1) Pathology of the small intestine, and (2) Hepatitis, cirrhosis hepatitis, and their possible connection. Panel discussions, lectures and film shows will be arranged and scientific and technical-

commercial exhibits organized. Original reports on these and other gastro-enterological subjects, either clinical or in the field of the basic sciences, are invited. Titles with a summary of not more than 200 words should be sent by 1 August 1959 to Dr. B. K. Boom, Congress Office, Department of Gastro-enterology University Hospital, Leiden, the Netherlands. The official language will be English, but French, German and Spanish will be used, with simultaneous translation. The registration fee, including an official reception, a banquet and an excursion will be \$45 until 1 November 1959, when it will be \$55. Accompanying family members \$20. For further information and registration apply to the Congress Office as above.

NEW PREPARATIONS AND APPLIANCES : NUWE PREPARATE EN TOESTELLE

ABRAMS PLEURAL BIOPSY PUNCH

Westdene Products (Pty.) Ltd. announce that the Abrams Pleural Biopsy Punch, manufactured by the Genito-Urinary Manufacturing Co. Ltd., England, is now available in South Africa, and supply the following information:

This instrument enables a biopsy specimen to be taken from the parietal pleura when an effusion is aspirated, without risk of damage to the lung. It is large enough to take a satisfactory specimen (4 mm. in external diameter) without causing more discomfort than ordinary aspiration under local anaesthesia. Because the biopsy is clean-cut, the histological picture is undistorted.

It consists essentially of two concentric tubes and a stylet. The short trocar point is sharp enough to penetrate the chest wall after a small incision has been made in the skin, but it does not puncture the lung if the effusion is completely aspirated. Behind the point is a deep notch in the outer tube, which can be closed by twisting the hexagonal grip clockwise, and so sliding a pin on the base of the inner tube along the oblique slot in the base of the outer tube and advancing a sharp cutting cylinder just past the notch with a rotary movement, thus cutting off and holding any tissue engaged therein. A spring clip holds the pin in either the open or the closed position sufficiently firmly to prevent inadvertent movement.

Any type of syringe mount may be specified; so the punch can be used with apparatus for routine aspiration. The two tubes can be completely separated for cleaning, and as all the parts are either stainless steel or heavily plated, they can be sterilized by boiling.

Enquiries, Westdene Products (Pty.) Ltd., P.O. Box 7710, Johannesburg.



MERBENTYL

Mer-National Laboratories (Pty.) Ltd. announce their new product, Merbentyl and supply the following information:

Merbentyl is the Merrell trade-name for dicyclomine hydrochloride (diethylaminocarbethoxybicyclohexyl)—a double-acting selective antispasmodic. It is a non-narcotic synthetic compound exerting a potent double spasmolytic effect upon the smooth muscle of the gastro-intestinal tract. Studies have shown a low toxicity without any cumulative action.

Musculotropic action. Merbentyl resembles papaverine in that it relieves spasm by direct relaxation of smooth muscle. It is, however, non-narcotic, being unrelated to the opium alkaloids.

Neurotropic action. Merbentyl selectively blocks the action of acetylcholine at the postganglionic parasympathetic nerve endings. This anticholinergic effect is confined to the smooth

muscle of the gastro-intestinal tract, there being no effect upon the nervous pathways which innervate other organs. It has virtually no effect upon gastric secretion.

Advantages. Because of its selective dual spasmolytic action Merbentyl virtually eliminates unwanted side-effects. Laboratory studies show that effective antispasmodic doses of Merbentyl have only 1/35th of the antispasmodic effect and 1/50th of the mydriatic effect of equivalent doses of atropine. Clinical experience shows that Merbentyl rarely produces blurred vision, dry mouth, urinary retention or cardiac effects. In doses many times the usual oral clinical dose, no mydriatic effect was produced, resulting in the conclusion that Merbentyl is safe even in glaucoma.

Indications. Prompt and striking relief from spasm pain has been obtained in a variety of functional gastrointestinal disorders. Merbentyl is indicated in conditions involving smooth muscle spasm and hypertonicity, including pylorospasm, irritable colon syndrome, infant colic, biliary dyskinesia, and spastic constipation. In paediatric use excellent results have been obtained in infant colic, regurgitation and pylorospasm. Colic and spasm pain are rapidly relieved without flushing, fever and other belladonna-like side-effects. A special pleasant tasting syrup is available for paediatric use.

Supplies

Merbentyl is available in convenient dosage forms for all ages. Merbentyl Tablets plain and with phenobarbitone (bottles of 50 and 250). Each tablet of Merbentyl plain contains 10 mg. of dicyclomine hydrochloride. Each tablet of Merbentyl with Phenobarbitone contains 10 mg. of dicyclomine hydrochloride plus 15 mg. of phenobarbitone.

Merbentyl Syrup plain (4 oz. bottles) and with phenobarbitone (4 oz. bottles). Each teaspoonful of Merbentyl Syrup plain contains 10 mg. of dicyclomine hydrochloride. Each teaspoonful of Merbentyl Syrup with Phenobarbitone contains 10 mg. of dicyclomine hydrochloride plus 15 mg. of phenobarbitone.

Dosage. Merbentyl tablets or syrup, plain and with phenobarbitone: *Adults*, 2 tablets or 2 teaspoonfuls of syrup t.i.d. before or after meals. Repeat, if necessary, at bedtime. *Infants*, ½-1 teaspoonful of syrup 10-15 minutes before each feeding, not to exceed four (4) doses in any 24-hour period. Dilute syrup with equal parts of water for infants under 2 weeks old.

Manufactured under the control of the Wm. S. Merrell Company, Cincinnati, USA. Marketed in Africa by Mer-National Laboratories (Pty.) Ltd., P.O. Box 4551, Johannesburg. Distributed by Westdene Products (Pty.) Ltd., P.O. Box 7710, Johannesburg.

TACE

Mer-National Laboratories (Pty.) Ltd. announce their new product, Tace, and supply the following information:

Tace is a synthetic compound with potent oestrogenic activity. Each capsule contains 12 mg. of Tace brand of chlorotrianisene (tri-para-anisyl chloroethylene) in corn oil.

Because of its distinctly different formula, Tace possesses a number of unique properties: On oral administration it is rapidly absorbed, and partly accumulates in the body fat, from which it is liberated gradually, in ever decreasing quantities over a substantial period of time. As a fat-stored oestrogen for oral administration it is unique.

In animals the pituitary enlargement, which is a characteristic

result of repeated administration of other oestrogens, does not occur. Similarly it has been proved clinically that Tace has no demonstrable effect on the adrenals and, unlike other oestrogens, does not produce adrenal hypertrophy or hyperactivity.

Clinical Action and Uses

In the climacteric syndrome—where the periods have stopped but symptoms continue—the fat storage of Tace produces a continuous even release of oestrogen which continues even after cessation of therapy. The prompt symptomatic relief is therefore prolonged and often persists for months after Tace is discontinued. This has been borne out clinically by sustained vaginal cornification and reduced pituitary gonadotrophin levels. Gradual oestrogenic release from body fat simulates natural hormonal secretion, assisting the patient to make a physiological adaptation to a normal, symptom-free postmenopausal state. Tace brings about a restored sense of belonging, and smoothly declining oestrogen levels obviate the peak-and-valley effect of short-acting oestrogens, thus virtually eliminating withdrawal bleeding. In those patients where symptoms continue beyond cessation of menstruation, one short course of Tace—2 capsules daily for 30 days—may often hasten the post-menopausal adjustment and avoid dependence on protracted oestrogen therapy. In severe and recurrent cases, additional courses of Tace may occasionally be required.

Postpartum Breast Engorgement. Clinicians have reported that Tace is a superior oestrogen for the suppression of lactation. Fat storage and its gradual release after cessation of therapy greatly reduce recurrence of re-engorgement symptoms and virtually eliminate withdrawal bleeding.

Prostatic Carcinoma. Tace has provided truly satisfying and even dramatic results in the palliative treatment of prostatic carcinoma. It has achieved effective results as demonstrated by relief of pain, increase in weight, and improvement in the pathological and blood pictures. In many cases this has been effected in patients where other oestrogens had failed.

Because Tace, unlike other oestrogens, has no demonstrable effect upon the pituitary and adrenals, the danger of androgen rebound may be averted. Lack of adrenal activation may account for the superior effects of Tace over other oestrogens and the high survival rates in patients treated with Tace.

Besides providing prolonged around-the-clock protection, Tace is extremely well tolerated. Gynaecomastia, nausea and vomiting, and oedema, are rarely encountered.

Indications and Dosage. For relief of menopausal symptoms, 2 Tace capsules daily for 30 days. In severe cases where symptoms recur additional courses may be required. For *postpartum breast engorgement*, 4 Tace capsules daily for 7 days. For palliative control of *prostatic carcinoma*, 1 or 2 Tace capsules daily.

Note. Gradual release from fat depots makes Tace especially valuable in the climacteric patient whose periods have ceased. Relative freedom from withdrawal bleeding with Tace precludes its use in cases where oestrogens are required to induce cyclical bleeding.

Supplied in bottles of 60 and 300. Each capsule containing 12 mg. of Tace (chlorotrianisene).

Manufactured under the control of the Wm. S. Merrell Company, Cincinnati, USA. Marketed in South Africa by Mer-National Laboratories (Pty.) Ltd., P.O. Box 4551, Johannesburg. Distributed by Westdene Products (Pty.) Ltd., P.O. Box 7710, Johannesburg.

A VAN FOR HOSPITAL TRANSPORT

The following information is supplied by Keith Pulvermacher (Pty.) Ltd., Phoenix House, Burg Street, Cape Town, and Pharmacy House, Jorissen Street, Braamfontein, Johannesburg.

To facilitate the transport of medical equipment, laundry hampers and similar supplies between hospitals, a specialized vehicle has been purchased by the Northern Ireland Hospital Authority.

Based on a petrol-engined Karrier Bantam chassis/cab of 8 ft. 2 in. wheel-base, the vehicle is fitted with a box-van body, the sides of which are formed by 4 large sliding panels (2 on each side) individually secured by handle-operated locks. In addition two vertically-hinged doors are fitted at the rear of the body. In this way easy access can be gained to the interior of the body, even when the vehicle is parked in a confined space. This feature, combined with the low loading height and short wheel-base of the chassis, provides a vehicle ideally suited for inter-hospital transport.

As the body, which measures 10 ft. 10 in. long \times 5 ft. 7 in. high \times 6 ft. 3 in. wide, is constructed from light alloy sheet, it can be easily cleaned and maintained.

The body was constructed by Harkness Coachworks Ltd., Belfast, and the vehicle was supplied by A. S. Baird Ltd., the Belfast distributors for Rootes Group products.

REVIEWS OF BOOKS : BOEKRESENSIES

THE MATRIX OF MEDICINE

The Matrix of Medicine. Some Social Aspects of Medical Practice. Edited by Nicolas Malleon, M.D., M.R.C.P. Pp. xviii+234. 4 Figures. 1 Plate. 137 References. 45s. net. London: Pitman Medical Publishing Company Ltd. 1958.

Can the general practitioner be linked with hospital and nursing facilities; what is a family doctor; how can his work, and interest be improved; does religion make any difference to the management of a young married woman with mitral stenosis; is cancer of the lung preventable; are nurses 'sickness nurses' or are they encouraged in their training to assist the patient towards happier living?

These are some of the practical questions discussed by a variety of authors including the clinicians Cicely Williams, Reginald Lightwood and A. F. L. Logan, a nurse, and a general practitioner, in a book which is written largely in non-technical language and will have a wide appeal. Medical students and young nurses will obtain a broad understanding of the relevance of the patients' culture, environment and domestic background in the treatment of his illness, while the knowledgeable, the experienced and the teacher of medicine, including the specialities, will find much that is useful and stimulating.

Workers in the fields of mental health will be interested in almost every chapter and will not be disappointed with chapter XI. Child Welfare is discussed from several angles.

A few may argue, but all will be impressed by the facts and outspoken views presented by H. Joules in his chapter on preventable chest diseases. His holistic approach involves industry, government taxation, habits and emotions of the population,

as well as overcrowding in the causes of 46,000 deaths per year in England and Wales—30,000 from bronchitis (not reduced by antibiotics) and 16,000 from cancer of the lung.

Treatment of the 'lesion' has led to amazing control of tuberculosis, diabetes etc., but 'the conquest of disease has not proved to be the conquest of suffering'. Dr. Malleon is to be congratulated on assembling a series of convincing articles on treating the 'person' and not merely his 'disease'.

B.J.K.

AFRICAN INTERLUDE

African Interlude. By J. F. Holleman. Pp. 278. 6 Photos. 21s. Cape Town: Nasionale Boekhandel Beperk. 1958.

African Interlude is a powerful testimony of faith in humanity and the brotherhood of man; one of the most moving documents to come out of Southern Rhodesia; an exciting, splendid tale of adventure.

Early in December 1945 an idealistic young anthropologist entered the Sabi valley. From the Rhodes-Livingstone Institute he had received a generous Fellowship sponsored by the Beit Railway Trust for work among the Mashona tribes of Southern Rhodesia. He came for 3 years and was enabled to stay for 6. *African Interlude* is the absorbing account of his exciting and unusual experiences, encounters and adventures during those 6 years in the wilds of Africa. It is a compelling document infused with a spirit of rare compassion and sincerity. For Dr. Holleman is a humanist trained in the essentials of the humanistic tradition. 'A man who is prepared to fight for an ideal could do much for happiness of millions of indigenous people,' his father

had said and the writer has heeded the voice of conscience to which this remarkable book bears clear and unmistakable testimony.

His findings gathered with great patience and extraordinary perseverance are recounted in a lively, amusing narrative enriched with fascinating information about Mashona tribal and marriage customs, kinship laws, social and political organizations, land tenure rights, contractual obligations, tribal court sessions and the much discussed and criticized lobola system (the payment of cattle to the family of the bride). These invaluable findings were eventually to form the basis for Dr. Holleman's scientific treatise *Shona Customary Law* which has only recently established itself as a standard work of reference in the courts of Southern Rhodesia. *African Interlude* is the human and highly personal story which lies behind the compilation of this very important contribution to Rhodesian Native Legislation.

J.K.S.

METABOLISM OF THE NERVOUS SYSTEM

Metabolism of the Nervous System. Edited by Derek Richter. Pp. xiv+599. Illustrations. £5. London, New York and Paris: Pergamon Press. 1957.

This volume contains the proceedings of the 2nd International Neurochemical Symposium held at Aarhus, Denmark, in July 1956. The first symposium held in 1954 dealt with the embryology of the nervous system and the proceedings were published under the title *Biochemistry of the Developing Nervous System* (Academic Press, 1955). The present volume supplements and extends the previous one by giving a fuller account of the metabolism of adult nervous tissues. Recent work of outstanding interest and importance was presented and discussed.

The following are some results of special interest. Most of the energy required by the brain is derived from the metabolism of glucose, but recent observations indicate that certain types of brain cells under certain conditions have the ability to oxidize lipids. The paper on nerve metabolism discusses the relationship between oxidative processes common to all animal cells and the electrochemical processes of conduction common to all axons. Following the ionic exchange associated with each nerve impulse, adenosine triphosphate (ATP) is used to resort the ions and to restore the initial state of the membrane structure. Subsequently the ATP content is restored by glycolytic and oxidative phosphorylation. It seems that the axons have an oxidative machinery not unlike that of other cells. In the paper on the nature of the synaptic transmitter substances evidence is presented which indicates that acetylcholine cannot be the transmitter agent at all central synapses. The author examines the evidence for non-cholinergic transmitter substances including a new factor which produced excitation of the cerebellum.

In work on the cholinesterase of developing neurones the tadpole of *Xenopus laevis* was chosen for the investigation because it has several special advantages e.g. large batches of eggs can be obtained to order by injections of pituitary gonadotrophins into adults, hatching occurs after only 3 days and is followed by a larval existence lasting many weeks, and the tadpoles are so transparent that it is easy to make detailed observations and surgical operations on them.

The final section of this symposium includes a report summarizing biochemical work on the identification, localization, formation, and metabolism of serotonin in the central nervous system.

The symposium will appeal mainly to biochemists. Not only does it deal with the special metabolism of nervous tissue but there is also a wealth of information on the general aspects of metabolism. As Lipmann points out: 'From the point of view of the general biochemist it was rather satisfying to find that it practically is impossible to attack any major biochemical problem without contributing to some extent to the understanding of brain metabolism'.

Some 30 years ago Joseph Needham wrote: 'I by no means accept the opinion that the phenomena of the mind are not amenable to physico-chemical description. All that we shall ever know of them scientifically will be related as closely as possible to physico-chemical facts obtained from observations on cerebral metabolism'. This symposium on the metabolism of the nervous system represents a contribution to the ultimate realization of that goal.

H.Z.

THE FOSTERING OF YOUNG CHILDREN

Where Love Is—The Fostering of Young Children. By Josephine Balls. Pp. 224. 16s. London: Victor Gollancz Ltd. 1958.

Commissioners of child welfare, probation officers and social workers should read this book, as well as the members of child care organizations and the board members of homes for unmarried mothers. The last mentioned could well ponder the following view: 'Where it can be clearly seen during pregnancy that adoption is the answer, it would perhaps be wiser to forgo breast-feeding and separate mother and child when they leave hospital. This may sound a hard-hearted policy, but if a break has to be made it is surely kinder to make it before the mother's instinctive emotions cloud her better judgement.'

Miss Ball's book is a plea for foster care for children under five who are committed under the Children's Act. She is of the opinion that such young children cannot receive the proper care in institutions. She describes an experiment by Northumberland County when it closed its institution for under-fives in 1952 and placed all the children in foster care. Miss Balls discusses a number of case histories to prove her opinion. Finally, there is a chapter on prevention. She discusses various ways in which families in need can be assisted. Many of these are practised in this country but the following should be carefully considered by our welfare organizations and social workers: Training homes for neglectful mothers, nursery play centres, rest homes for mothers and children, domiciliary nursery nursing services and parentcraft in schools.

H.C.L.

HEART RECORDINGS

Heart Recordings. A Group of Auscultatory Findings with Suggestions to help in Self Training. By George David Geckeler, M.D. CBS BLD 7089. Sole Distributors: Gramophone Record Co. Ltd.

This long-playing record aims to assist and train students in the art of cardiac auscultation. The makers must be congratulated on this novel form of medical education and on the excellent sound recordings produced of a difficult subject. However, whether it would be of any assistance at all to the student or doctor is doubtful.

The subject matter consists, for the most part, of mitral valve disease, particularly stenosis, with some information on aortic incompetence and patent ductus arteriosus. The other common murmurs of congenital heart disease are not even mentioned. The sounds and murmurs produced are of necessity distorted and do not really resemble what is heard at the bedside. It certainly cannot replace bedside auscultation, which has to be learned by each individual student on live patients. Whether it will be of any real benefit listening to the murmurs in a quiet room, divorced from the patient, is doubtful.

Certain statements are, to say the least, debatable and some are unacceptable. For example, the statement that the opening snap is usually associated with the mitral systolic murmur is completely invalid. In the development of mitral stenosis a presystolic murmur is stated to occur when the mitral valve has reached a buttonhole orifice. It is well known that even after successful mitral valvotomy when the mitral orifice is wide, a presystolic murmur persists.

The sound reproductions of innocent systolic murmurs certainly do not sound innocent, probably due to distortion and amplification. No attention at all is paid to the duration of the systolic murmur nor to the importance of the site of maximal intensity of the murmur.

The record is of interest as an example of progress in modern electronics and in recording systems. Whether it will serve any useful purpose to the student is open to question.

V.S.

RADIATION BIOLOGY

Medical Radiation Biology. By Friedrich Ellinger, M.D. Pp. xxxiv+945. Illustrations. £7 10s. 0d. Oxford: Blackwell Scientific Publications. 1957.

Many disciplines have raised the subject of medical radiation biology to its present important stature in 20th century medicine. The subject has become the concern of a vast body of medical practitioners and scientists, to whom the advent of atomic energy

has brought a bewildering array of new problems and responsibilities.

The literature in this large and rapidly growing field is scattered throughout countless journals and texts, reports of conferences and symposia, and it increases faster than can be tabulated or digested. Many of the latter are specialized text-books, independent of one another, and devoted to the diverse facets of the subject, such as radio-therapy, radiation chemistry, radiation physics and nuclear medicine. There is a long-felt need for a synthesis of knowledge and coordination in this field.

One must, therefore, pay tribute to Dr. Ellinger's initiative and industry for having undertaken the mammoth task of writing this major treatise, which is largely a vast record of factual information relating to experimental work and human clinical data.

The author presents in systematic fashion the fundamental concepts of radiation interaction with living cells, tissues, and the whole body, induced, by a wide spectrum of ionizing radiations. Brief consideration is given to the physical and chemical changes which precede the final biological consequences, gross and microscopic, and which comprise the major body of the book.

The author defines the relative radiosensitivity of different tissues, tolerance doses, the vulnerability of normal and neoplastic tissue, and differential recovery rates which elucidate the rationale of radiotherapy, and the nature of radiation hazards.

One feels that this somewhat lengthy book could have been shortened by the omission of much data which is now obsolete and historical. The same applies to demodulated radiotherapy techniques, such as Pfahler's X-ray treatment of thyrotoxicosis (page 310).

The wide adherence to the concept of 'air dose' is to be deplored in a modern radiation text-book. More graphs, tables and diagrams would have made a clearer presentation of many aspects.

There are a few errors (such as in the table on page 126 relating to field size) which do not, however, detract from the value of this work. The bibliography of 4,600 titles is indicative of the book's broad scope, and must surely be one of the most comprehensive reference lists available anywhere in a single volume.

The book is to be recommended to those readers who have had some basic training in radio-biology, and who desire an appropriate source of reference. It would be a valuable addition to any library frequented by research workers, medical practitioners, radiologists, military, industrial and public health personnel.

The printing, binding and illustrations are of a high standard.
D.D.

BLOOD PROTEINS

Entzündung und Bluteiweisskörper. Von Priv.-Doz. Dr. H. Odenthal. viii+115 Seiten. 32 Abbildungen. DM 19.50. Stuttgart: Georg Thieme Verlag. 1958.

The author outlines his method of chemical analysis and reliability of statistics achieved. The normal values are displayed and compared to those obtained during pathological conditions with special emphasis on infection and equivalent aberrations. It is also quoted that the normal fibrinogen value is directly proportional with the age group. A value varying from 200-400 mg.% is regarded as normal. All values in this series were determined by means of electrophoresis.

According to their study all acute inflammations cause a sudden increase in fibrinogen and α -globulin with a proportional drop in albumin concentration. A large haemorrhage produces a lowering of all fractions of blood proteins with in normal ratio. The author's figures also indicate that fibrinogen exerts an increased permeability during acute infections in an attempt to localize further spread of disease. Chronicity of all forms produces an increase in Alpha-globulins especially where antibody formation is required.

Leucocytosis-promoting factor is reviewed. The general consensus of opinion seems to regard Alpha-globulin as the stimulus initiating an increased leucocytosis via chemotaxis. Leucocytosis appears to be more effective in the presence of leucotoxin, hyaluronidase, hyaluronic acid and histamin. Mention is also made of a non-specific agglutinin which occurs in the serum of rheumatic fever sufferers—something which has not yet been fully investigated. The characteristic features of secondary infections

include reduced albumin concentration with increased globulin, fibrinogen and antibody formation.

It is also the experience of the author that large doses of cortisone and A.C.T.H. result in involution of lymphatics and lymph nodes, spleen and connective tissue i.e. that these drugs act like a tissue poison.

PSYCHOANALYSIS

D.J.H.

Science and Psychoanalysis. Volume I. Integrative Studies. Edited by Jules H. Masserman, M.D. Pp. vi+201. \$5.75. New York and London: Grune and Stratton, Inc. 1958.

The Academy of Psychoanalysis was formed in Chicago in April 1956, one of its objects being 'to constitute a forum for inquiry into the phenomena of individual motivation and social behavior'. It is constituted of psychoanalyst members and scientific associates from the behavioural sciences and allied fields.

This volume comprises a number of papers presented to the Academy in May 1957. The subjects dealt with in Part I, under the heading 'The Interdisciplinary Survey of Psychoanalysis' are a philosophical appraisal of psycho-analysis, its biological roots, anthropological roots and pre-Freudian origins. There are also two good papers on the difficulties of communication among psychiatrists themselves and with patients in psychotherapy. Part II consists of discussion on the above papers in which marked differences of opinion are sometimes very vigorously expressed. Part III, an incongruous tail-piece by the editor, entitled 'A Musical Interlude' could well have been omitted.

This volume, though not entirely satisfying, is stimulating and one can look forward with interest to future publications in the same series.

W.A.S.

THE ELECTRO-ENCEPHALOGRAPH IN CHILDREN

L'elettroencefalogramma del Bambino Normale. By Fois. Pp. 140. Pisa: Istituto di Ricerche V. Baldacci Editore. 1957.

In order to dispel what he claims are misconceptions and mistakes in interpreting the electro-encephalograms of children, the author undertook a special study in this field. This book is an account of his investigations and a record of encephalograms obtained in normal children up to the age of 14 years. There are 30 pages of Italian text and the remainder of the volume is taken up with the reproduction of 101 Figures, each consisting of 8 distinct electro-encephalograms; the inclusion of these tables imposes a special format of this edition of a kind one usually associates with a book of drawings.

Profound differences in type exist between the encephalogram of the adult and that of the child and the present collection of recordings made in the department of Pediatrics of the University of Sienna by Dr. Fois and his collaborators is intended to show up these differences and establish standards for comparison.

A brief description of the physiology underlying the changes of electrical potentiality in the brain is given and the author outlines the technique he used to register them. He employs small electrodes of silver, 4 on each side of the cranium, symmetrically disposed and so connected to the amplifying recording apparatus that movements of the child cannot upset the experiment. In carefully chosen surroundings, records are made under varying conditions of mental activity, in deep sleep, light sleep, the fully awake condition and in mere drowsiness. Not only did Dr. Fois meet many individual variations but he also observed notable changes in the type of electrical waves in different age groups. Thus, in the 1-4 months age group, as could be expected, no great differences were observed between the recordings obtained in sleep and those obtained during the waking state. As the child grows older a different wave pattern emerges and these all receive the close attention of the expert author in presenting a picture more or less typical of each age group. He pays due tribute to previous workers in this line of research and the large bibliography at the end of the book bears witness that electro-encephalography has attracted many diligent workers.

This is not a book on the ready diagnosis of cerebral pathology by detecting and recording abnormal electrical wave impulses. It is, as the author insists, a record of findings in the normal child in varying states of cerebral activity.

It is idle perhaps, though interesting, to speculate on what

might be the patterns in normal adult types of different vocations. Would, for instance, the contented pensioner or placid landscape gardener provide a picture of smooth, rhythmic undulations to

contrast with the paroxysmal, unharmonious and explosive discharges of the party politician or busy medical practitioner. C.K.O'M.

CORRESPONDENCE: BRIEWERUBRIEK

WITWATERSRAND FACULTY, COLLEGE OF GENERAL PRACTITIONERS

To the Editor: As you know the National General Practitioners Group decided at the meeting of its Executive Committee on 30 September 1958 to sponsor the formation of Faculties of the College of General Practitioners, it being left to the individual areas to apply to the College of General Practitioners in Great Britain for recognition and the right to form a Faculty.

We, in the Witwatersrand area have acted accordingly, and have been granted that right by the Council of the College of General Practitioners in Great Britain. At a meeting held in Johannesburg on 21 November 1958 a Board of the Faculty was elected. The Faculty has been named the Witwatersrand Faculty of the College of General Practitioners, and the following were elected as office-bearers of the Board of this Regional Faculty: *Chairman* Dr. G. W. Schepers. *Vice-chairman* Dr. Derek Pirie. *Hon. Secretary/Treasurer* Dr. Leslie Levy. *Assistant Hon. Secretary* Dr. Michael Tonkin. *Members of the Board* Drs. S. Binder, R. C. de Kock, H. Parke Forster, S. Lachman, W. A. M. Miller, H. A. Shapiro, M. Shapiro, S. A. van Lingen.

Provisionally, we shall be prepared to receive applications for membership from General Practitioners in the Transvaal Province, until such time as other Faculties may be formed, when regional jurisdiction will be decided by mutual arrangement.

Applications for membership may be made to the Board of the Witwatersrand Faculty of the College of General Practitioners; letters should be addressed to Dr. Leslie Levy, 11 Millson House, 106 Twist Street, Hillbrow, Johannesburg.

We hope to hear in the near future that other Faculties have been formed, or are in the process of applying for recognition, so that we may contact them with a view to close cooperation.

The Board of the Witwatersrand Faculty of the College of General Practitioners extends to the Medical Association of South Africa its cordial greetings, and wishes to emphasize at the outset that its functions are purely academic, and wishes further to thank those individuals members and bodies of the Medical Association who have made it possible for us to achieve this ideal.

While the Faculty has been formed to promote academic interests of the General Practitioner, we must make it clear that we do not wish to remain an isolated body, but rather do we wish to cooperate with other existing academic organizations.

Ons wil ook graag herhaal dat toe daar besluit is om oor te gaan tot die stigting van Fakulteite in Suid-Afrika wat voorlopig ge-affilieer is met die Kollege van Algemene Praktisyns in Groot-Brittanje, dit gedoen is met die duidelike verstandhouding dat sodra ons in Suid-Afrika gereed is om selfstandig en onafhanklik te funksioneer, dit slegs 'n kwessie sal wees om so 'n besluit te neem en die Kollege van Algemene Praktisyns in Groot-Brittanje dienorekomstig in kennis te stel.

G. W. Schepers
74-80 Jenner Chambers. *Chairman, Witwatersrand Faculty, The Jeppe Street, Johannesburg College of General Practitioners*
22 November 1958

ASSESSMENT OF PELVIC PLASTIC SURGERY FOR CHRONIC PELVIC INFECTION

To the Editor: For many years I have been advocating plastic surgery for women with varying degrees of chronic pelvic infection causing symptoms such as menorrhagia, oligomenorrhoea, dysmenorrhoea, dyspareunia, general ill health often as a result of chronic appendicitis, loss of libido, and infertility. My views on the source of infection in these cases are well known to many practitioners. I have now done a very large number of pelvic plastic operations, including ovarian repair, salpingolysis, freeing of densely adherent uteri, meticulous peritonizing of raw areas and, last but not least, salpingostomy without polythene tubing.

The gynaecological out-patient clinics at the Conradie Hospital, Pinelands, and the New Somerset Hospital, Green Point, are large and numerous. I have attempted three follow-ups—1939,

1949 and 1958. The results of the operations I have personally performed are most gratifying, judging by my standards. I claim 80% good results, 15% fairly good and 5% unsatisfactory. The cure rate of infertility I assess at 33½% at least. I cannot however verify these figures without a greater number of written replies or personal interviews with patients who have been operated on.

May I make an earnest appeal to my colleagues, especially those in the Cape Peninsula, to let me have the addresses (they change so often) of any cases whom I have operated upon and who are now under their care.

At last month's meeting of the Cape Western Branch of the Association such divergent views were expressed by consultants and general practitioners that a fuller investigation is necessary of the relative results from (a) the radical removal of pelvic organs, (b) physiotherapy (e.g. diathermy) and (c) the pelvic toilette type of surgical treatment. These operations should now, once and for all, be weighed up and either found wanting or otherwise.

D. P. de Villiers

Robb's New Buildings
Belmont Road, Rondebosch, Cape
24 November 1958

9TH INTERNATIONAL CONGRESS OF PAEDIATRICS MONTREAL, 19-25 JULY 1959

To the Editor: Through the medium of the *Journal* I should like to appeal to all paediatricians who have decided to go to the above Congress please to advise me.

E. Fasser
South African Paediatric Association
201 Medical Centre
319 Pretorius Street, Pretoria
21 November 1958

THE HALF-CROWN NOTIFICATION FEE

To the Editor: The completion of Notification of Disease Form 180 (Health) and book entries associated with it call for a considerable amount of time and labour. In former times, when money was 3 times as valuable as it is today, the fee for such notification was 2s. 6d., as it still is. It is high time that the fee was raised to 7s. 6d.

When lawyers complete simple legal documents their usual fee seems to range from 10s. 6d. to £2 2s. 0d. Why should doctors be paid such a pathetically low fee for completing Form 180 (Health)?

F. A. Lomax
91 Cross Street, Kroonstad
25 November 1958

UNREGISTERED PHYSIOTHERAPISTS

To the Editor: The Central Executive Committee of the South African Society of Physiotherapy is deeply concerned that some medical practitioners are using the services of unqualified and unregistrable persons where qualified physiotherapists are available. We should like to draw the attention of the members of the Medical Association of South Africa to the fact that there is a Directory of Private Practitioners in Physiotherapy available. All the persons on this register are fully qualified and are members of the South African Society of Physiotherapy and registrable with the South African Medical and Dental Council.

This Society has striven for many years to obtain and maintain a uniform and high standard of physiotherapy and has the full support of the South African Medical and Dental Council. We therefore appeal to your members through the medium of the *Journal* to support the members on our register. Many copies of the register have already been circulated to members of the medical profession, and extra copies may be obtained from the General Secretary, South African Society of Physiotherapy, P.O. Box 11151, Johannesburg.

(Miss) J. Blair
Chairman
P.O. Box 11151, Johannesburg
21 November 1958 For South African Society of Physiotherapy